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THE ANNALS  
AND  
MAGAZINE OF NATURAL HISTORY,  
INCLUDING  
ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'ANNALS' COMBINED WITH LONDON AND  
CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

CONDUCTED BY  
ALBERT C. L. G. GÜNTHER, M.A., M.D., Ph.D., F.R.S.,  
WILLIAM CARRUTHERS, F.R.S., F.L.S., F.G.S.,  
AND  
WILLIAM FRANCIS, JUN., F.L.S.

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VOL. XI.—SEVENTH SERIES.  
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1903.

2

"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ:—ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; à verè eruditis et sapientibus semper exulta; malè doctis et barbaris semper inimica fuit."—LINNÆUS.

"Quel que soit le principe de la vie animale, il ne faut qu'ouvrir les yeux pour voir qu'elle est le chef-d'œuvre de la Toute-puissance, et le but auquel se rapportent toutes ses opérations."—BRUCKNER, *Théorie du Système Animal*, Leyden, 1767.

. . . . . The sylvan powers  
Obey our summons; from their deepest dells  
The Dryads come, and throw their garlands wild  
And odorous branches at our feet; the Nymphs  
That press with nimble step the mountain-thyme  
And purple heath-flower come not empty-handed,  
But scatter round ten thousand forms minute  
Of velvet moss or lichen, torn from rock  
Or rifted oak or cavern deep: the Naiads too  
Quit their loved native stream, from whose smooth face  
They crop the lily, and each sedge and rush  
That drinks the rippling tide: the frozen poles,  
Where peril waits the bold adventurer's tread,  
The burning sands of Borneo and Cayenne,  
All, all to us unlock their secret stores  
And pay their cheerful tribute.

J. TAYLOR, *Norwich*, 1818.





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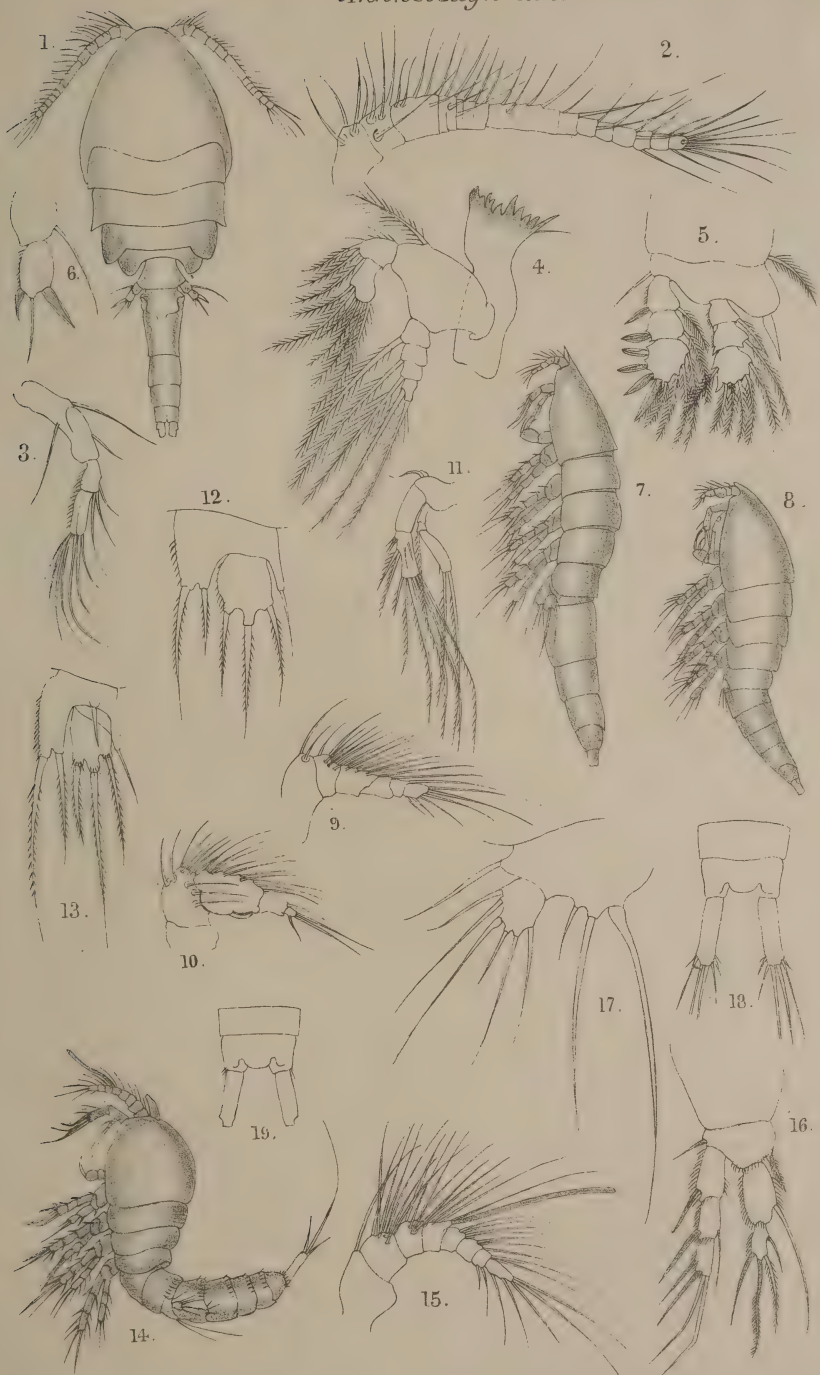
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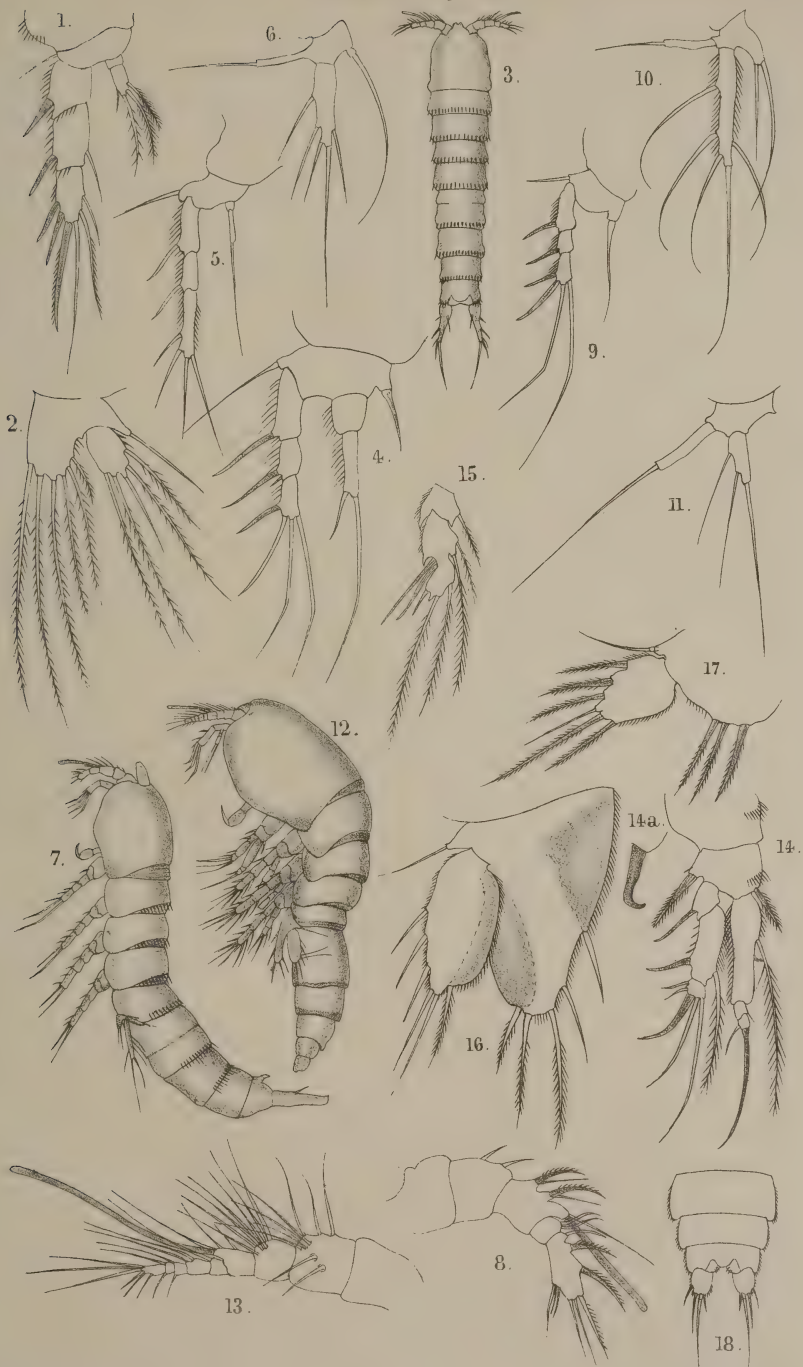


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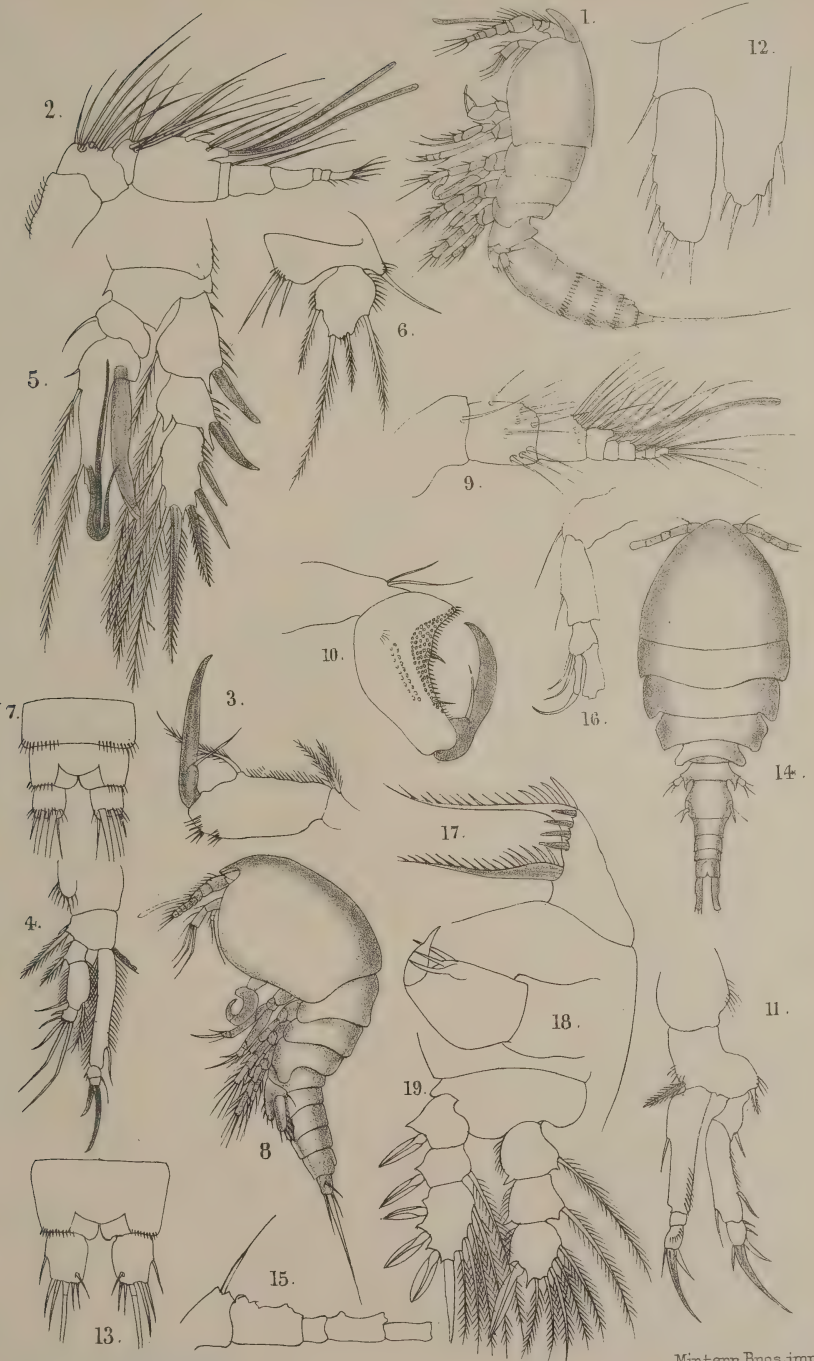


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THE ANNALS  
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[SEVENTH SERIES.]

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"..... per litora spargite muscum,  
Naiades, et circum vitreos considite fontes:  
Pollice virgineo teneros hic carpite flores:  
Floribus et pictum, divæ, replete canistrum.  
At vos, o Nymphæ Craterides, ite sub undas;  
Ite, recurvato variata corallia trunco  
Vellite muscosis e rupibus, et mihi conchas  
Ferte, Deæ pelagi, et pingui conchyliis succo.  
*N. Parthenii Giannattasi, Eol. 1.*

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No. 61. JANUARY 1903.

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I.—*Notes on the Natural History of East Finmark.* By  
Canon A. M. NORMAN, M.A., D.C.L., LL.D., F.R.S.,  
F.L.S.

[Continued from vol. x. p. 486.]

[Plates I.-IV.]

CRUSTACEA (continued).

THE gatherings of Copepoda which were brought by me from East Finmark have been placed in the hands of Mr. Thomas Scott, whose knowledge of the smaller and more difficult forms of this order is unsurpassed. I am greatly indebted to him for his report, which makes the account of the Crustacea complete.

The following species, which are not among those collected by myself, have been recorded from East Finmark—the first seven by Professor G. O. Sars \*, the *Canthocamptus* by

\* Sars (G. O.), 'An Account of the Crustacea of Norway,' vol. iv. Copepoda Calanoida (now in course of publication).

Prof. Lilljeborg\* in a paper received during the present month, and the *Balænoophilus* by Aurivillius†. *Balænoophilus* is described as living on the baleen-plates of *Balænoptera Sibbaldii*, Gray.

*Pseudocalanus elongatus*, Boeck.

*Undinopsis Bradyi*, G. O. Sars.

*Euchaeta norvegica*, Boeck.

*Diaptomus bacillifer*, Koelbel.

— *laciniatus*, Lilljeborg.

*Heterocope borealis*, S. Fischer.

*Metridia longa*, Boeck.

*Canthocamptus insignipes*, Lilljeborg.

*Balænoophilus unisetosus*, P. O. C. Aurivillius.

Among the Copepoda dredged in the Varanger Fiord was a beautiful new genus which I had procured two years previously in the Firth of Clyde. I have had for some years full drawings of this Copepod ready for publication, and I here give a preliminary notice of it.

#### ANCORABOLUS ‡, Norman, gen. nov.

*Antennules* three-jointed. *Antennæ* without a secondary branch, composed of two elongated joints. *First feet* with the second basal joint produced and bent outwards, with the inner branch attached to the base of this joint, and two-jointed; the second joint terminating in three plumose setæ (instead of the claw which is usual in some allied genera): outer branch also two-jointed. *Second, third, and fourth feet* with second basal joints long, the inner branch two-jointed, the first being small; outer branch three-jointed. *Fifth feet* elongated and slender, inner branch terminating in a narrow elongated lobe of unusual length; outer branch also consisting of a single narrow joint.

The antennæ and second and two following feet in this genus resemble those of the genus *Laophontodes*, but the first and last feet are very different from those of that or of any other allied genus.

#### *Ancorabolus mirabilis*, Norman, sp. n.

Cephalosome with a well-developed horizontally directed rostrum, which is cleft at the extremity and bears either one or two pairs of setæ on the sides situated on little protuberances. Cephalosome, metasome, and first three segments of

\* Lilljeborg, "Synopsis specierum hucusque in aquis dulcibus Sueciæ observatarum familiæ Harpacticidarum," Kongl. Svenska Vet.-Akad. Handl. vol. xxxvi. (Oct. 1902).

† Aurivillius (P. O. C.), "New Genus and Species of Harpacticida," K. Svenska Vet.-Akad. Handl. vol. v. (1879).

‡ An anchor-caster, ἄγκυρα and βάλλω.

urosome ornamented with a wonderful series of simple, furcate, or three-branched large horn-like processes, which are arranged as follows:—As regards the dorsal surface: on each side of the centre of the hinder margin of the cephalosome is a backward-directed, simple, lancet-shaped, setose process, flanked on the inner side by two minute similar processes; each of the four following segments is furnished with a similar pair of lancet-shaped processes, but devoid of the more minute flanking processes. This dorsal decoration is, however, inconspicuous and of little moment compared with the large appendages borne on the lateral margins, which are as follows:—On each side of the cephalosome there is near the base of the antennule a small simple process \*; this is followed by a trifid process, then by a bifid process, this again by another trifid process; these four processes increase in size from the first to the last. The first, second, and third segments of the metasome bear on their side a trifid process similar to the last of those on the cephalosome. On the fourth segment of the metasome and on the first three of the urosome the smaller of the three horns of the trifid process disappears, and the two that remain are more entirely separated from each other at their base and have acquired still greater size; so that the lower and larger of them attains on these segments a length which equals about three quarters of the breadth of the segment from which they spring.

The branches of the caudal furca are very long, nearly equalling the length of the three preceding segments; at half their length there is a spinule on the outer margin, and they terminate in a strong and greatly produced stiliform seta, at the base of which are two or three minute setæ. The length of the furca and its attached setæ is nearly if not quite equal to that of the entire rest of the animal.

Length 0·8 millim.

This is a most extraordinary and beautifully constructed species. Only one other genus of the Harpacticoida has yet been found which surpasses *Ancorabolutus* with respect to the remarkable development of the body ornament: that species is the wonderful *Pontostratiotes abyssicola*, G. S. Brady, of the 'Challenger' Expedition, which was dredged on the bed of the North Atlantic, lat. 37° 29' S., long. 27° 31' N., in 2200 fathoms.

*Ancorabolutus mirabilis* was first dredged in 1888 in the Firth of Clyde, when I was a guest of Sir John Murray in his steamer the 'Medusa.' It was blowing rather hard for dredging, and we ran under the lee of the east side of Little

\* This first small simple process appears to be sometimes absent.



Cumbræ and let down the dredge in about 20 fathoms. It came up filled with nothing but decaying seaweeds, which had been drifted together to that spot and which looked absolutely rubbish. But long experience had taught me that the most unlikely places sometimes produce most interesting things. I consequently worked some of this dead stuff through sieves in a tub of water, and that water having been passed through a muslin bag, the contents of the bag was bottled. Very few Crustacea were found on examination, but nevertheless there were three species new to Britain and two of them new to science—the Cumacean *Campylaspis sulcata*, G. O. Sars, the present species of *Ancorabolus*, and a second species of the same genus.

It is curious that two years after I should have a second time met with *A. mirabilis* at such a distance from its first-known habitat in the Varanger Fiord.

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*Notes on some Copepoda from the Arctic Seas collected in 1890 by the Rev. Canon A. M. Norman, F.R.S.* By THOMAS SCOTT, F.L.S.

The Copepoda recorded here are for the most part members of the family Harpacticidæ, but a few belong to other groups; they were collected by the Rev. A. M. Norman about the end of June and beginning of July, 1890, while on a visit to the Lofoten Islands and East Finmark, and I desire to express my indebtedness to him for permitting me to examine and record them. I have also to acknowledge the valuable assistance rendered by my son, Mr. Andrew Scott, in the identification of the smaller and doubtful species and for the drawings necessary to illustrate some of the descriptions of rare or apparently new forms.

The species and varieties recorded number sixty-four, and they belong to thirty-two genera. The localities where they were obtained are as follow:—Svolvær, Lofoten Islands; and in East Finmark from Lakse Fiord, Vadsö, Varanger Fiord, Bög Fiord, and Klosterelv Fiord. The following are the species identified or described:—

Fam. Calanidæ.

Genus CALANUS, Leach, 1816.

*Calanus finmarchicus* (Gunnerus).

One or two specimens, slightly immature, but apparently belonging to this species, were obtained in a gathering from Bög Fiord.

Fam. Phaënnidæ, G. O. Sars.

Genus PSEUDOPHAËNNA, G. O. Sars, 1902.

? *Pseudophaëнна typica*, G. O. Sars.

1902. *Pseudophaëнна typica*, G. O. Sars, The Crustacea of Norway, vol. iv. (Copepoda), parts iii. & iv. p. 44, pls. xxix., xxx.

Two imperfect specimens which appear to belong to this species occurred in the same gathering with *Calanus finmarchicus*. Prof. G. O. Sars obtained *Pseudophaëнна typica* at several places on the Norwegian coast from Christiania Fiord to Vardö, and adds that it is a true bottom form.

Fam. Stephidæ, G. O. Sars.

Genus STEPHOS, T. Scott, 1892.

*Stephos lamellatus*, G. O. Sars.

1902. *Stephos lamellatus*, G. O. Sars, *op. cit.* parts v. & vi. p. 62, pls. xli., xlii.

A few specimens (male and female) of this distinct species were also obtained in the same gathering from Bög Fiord with the species just recorded. Sars states that he obtained it not unfrequently at Bodö and Hammerfest, Finmark, in depths of about 30 fathoms, muddy bottom, and occasionally off the west coast of Norway at Christiansund. In *Stephos lamellatus* the fifth pair of thoracic feet of the male are moderately stout and prominent and the right leg terminates in a fascicle of digitiform appendages, which form one of the more distinctive characters of the species.

Fam. Diaptomidæ.

Genus DIAPTOMUS, Westwood, 1836.

*Diaptomus graciloides*, Lilljeborg.

1888. *Diaptomus graciloides*, Lilljeborg, Bull. Soc. Zool. de France, vol. xiii. p. 156.

This *Diaptomus* was common in a gathering from a small lake at Kirkenes, East Finmark, collected in July 1890. Sars states that it is not unfrequent in small tarns at Hammerfest and at Matsjok in Finmark. It appears to be a widely distributed species; it has been recorded by Prof. G. S. Brady from the British Islands.

## Fam. Temoridæ.

Genus HETEROCOPE, G. O. Sars, 1863.

*Heterocope appendiculata*, G. O. Sars.1863. *Heterocope appendiculata*, G. O. Sars, Oversigt af de indenlandske Ferskvandes-Copepoder, p. 224.

Specimens of this *Heterocope* occurred very sparingly in the gathering from the lake at Kirkenes containing the *Diaptomus graciloides*. The appendages on the underside of the first abdominal segment of the female appear to be peculiar to this species. G. O. Sars speaks of it as abundant in the great lakes of Norway, and it has been recorded by Nordquist from several lakes in the south-east of Finland. The species seems to have a wide distribution in Northern Europe.

## Fam. Cyclopidæ.

Genus CYCLOPINA, Claus, 1863.

*Cyclopina gracilis*, Claus.1863. *Cyclopina gracilis*, Claus, Die frei lebenden Copepoden, p. 104, t. x. figs. 9–15.

This species was observed sparingly in a gathering from Vadsö, but in none of the others; it appears, however, to have a wide distribution.

*Cyclopina Schneideri*, sp. n. (Pl. I. figs. 1–6.)

*Description of the female.*—The specimen represented by the drawing (fig. 1) measures rather more than 1 millim. in length. The cephalothorax, which is moderately robust, is fully one and a half times the length of the slender abdomen. The forehead is rounded, and the antennules, which scarcely reach to the end of the cephalic segment, are composed of twelve joints (fig. 2). The structure of the antennules resembles very closely that of the antennules of *Cyclopina gracilis*, Claus; but in the present species there are six small end joints, instead of five. The formula shows approximately the proportional lengths of the various joints:—

Numbers of the joints..	1	2	3	4	5	6	7	8	9	10	11	12
Proportional lengths ..	12	7	11	5	7	22	4	4	5	3	4	6

The antennæ also resemble the same appendages in *Cyclopina gracilis*; they are composed of four joints, the penultimate one being the shortest (fig. 3).



The mandibles (fig. 4) are short and stout and have a broad dentated biting-end; the palp is large and two-branched. The other mouth-organs appear to be similar to those of *Cyclopina littoralis*, G. S. Brady.

All the four pairs of swimming-feet, which also resemble those of that species, are comparatively short and have both branches of about equal length and composed of three joints; fig. 5 represents the first pair, and the other three are somewhat like this in form and structure.

The fifth pair are small and are each composed of two moderately broad joints (fig. 6); the first joint bears a single subapical seta, but the end joint is armed with two spines, one at each distal angle, and a small intermediate seta.

The genital segment of the abdomen appears to consist of two coalescent segments and is about equal to half the entire length of the abdomen; the remaining three segments are comparatively short (fig. 1).

The caudal furcæ are scarcely equal in length to the last segment of the abdomen.

I am very pleased to accede to the request of the Rev. A. M. Norman to name this distinct species after the well-known Norwegian carcinologist Herr J. Sparre Schneider, who was Dr. Norman's companion in his expedition of 1890.

*Hab.* Vadsö Sound, East Finmark; rather rare. No males were observed.

*Remarks.* *Cyclopina Schneideri*, as already stated, is in some respects not unlike *Cyclopina gracilis*, Claus, but it differs in having more robust mandibles and in the caudal furca being very short; moreover, it is about double the size of that species. It does not agree satisfactorily with any described species known to me.

## Genus EURYTE, Philippi.

### *Euryte longicauda*, Philippi.

1843. *Euryte longicauda*, Philippi, "Fernere Beobachtungen über die Copepoden des Mittelmeeres," Archiv f. Naturg. Jahrg. 9, p. 63, pl. iii. fig. 3, a-d.

1864. *Thorellia brunea*, Boeck, Oversigt Norges Copepoder, p. 26.

This species was obtained in gatherings from Svolvær, Lofoten Islands; Bög Fiord, Lakse Fiord, Vadsö Sound, and Varanger Fiord, East Finmark, and was of moderately frequent occurrence; the specimens appeared to be for the most part rather larger than those found in Scottish waters.

## Genus CYCLOPS, O. F. Müller.

*Cyclops strenuus*, Fischer.

1851. *Cyclops strenuus*, Fischer, Bull. de la Soc. imp. Naturalistes de Moscou, t. xxiv. (2nd part) p. 419, pl. ix. figs. 12-21.

This species was moderately common in the gathering from Lake Kirkenes along with *Diaptomus graciloides* and *Heterocope appendiculata*. In these specimens the caudal furca appears to be proportionally rather shorter than in those from the Scottish lakes, but, as Dr. Schmeil has shown in his splendid work on the freshwater Copepoda of Germany (1892-96), this, which is a widely distributed species, exhibits a tendency to variation even greater than is observed in some of the other members of the genus.

*Cyclops Brucei*, T. Scott.

1899. *Cyclops Brucei*, T. Scott, "The Crustacea of Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxvii. p. 93, pl. vi. figs. 1-6.

A number of specimens of *Cyclops Brucei* were collected near Vadsö; these are identical with those from which the species was described and which were obtained in a pond at Elmwood, near Cape Flora, Franz-Josef Land\*. Several of the specimens from Vadsö carried ovisacs.

## Fam. Harpacticidæ.

## Genus ECTINOSOMA, Boeck.

*Ectinosoma Sarsi*, Boeck.

1864. *Ectinosoma Sarsi*, Boeck, Nye Slægter og Arter af Saltvands-Copepoder, p. 45.  
1880. *Ectinosoma spinipes*, G. S. Brady, British Copepoda, vol. ii. p. 9, pl. xxxvi. figs. 1-10.

A number of specimens of this *Ectinosoma* were collected in Vadsö Sound, but the species was not observed in the other gatherings; it is one of the larger species of *Ectinosoma*.

*Ectinosoma propinquum*, T. & A. Scott.

1896. *Ectinosoma propinquum*, T. & A. Scott, Trans. Linn. Soc. 2nd ser. Zool. vol. vi. p. 428, pl. xxxvi. figs. 19, 27, 46, et seq.

This species was obtained very sparingly in gatherings from Lakse, Klosterelv, and Varanger Fiords. In general

\* In the original description of *Cyclops Brucei* it is stated inadvertently that the third and fifth joints of the female antennules are the shortest, instead of the third and sixth as shown by the drawing.

appearance and in size *Ectinosoma propinquum* resembles *Ectinosoma Sarsi* and may readily be mistaken for it; but one of the more obvious differences, and one I have found constant in all the specimens examined, is that in *E. propinquum* the fifth thoracic feet are shorter in proportion to their width, *i. e.* each of the fifth pair is about as broad as long, whereas in *E. Sarsi* the length is greater than the width.

*Ectinosoma curticorne*, Boeck.

1864. *Ectinosoma curticorne*, Boeck, Oversigt Norges Copepoder, p. 13.

*Ectinosoma curticorne*, which is a small species of a brownish colour, was obtained in Bög Fiord and between tide-marks at Vadsö, but it was less frequent in the Vadsö gathering than in that from Bög Fiord.

*Ectinosoma erythrops*, G. S. Brady.

1880. *Ectinosoma erythrops*, G. S. Brady, British Copepoda, vol. ii. p. 12, pl. xxxvi. figs. 11-17.

The only gathering in which this species was observed was collected in Lakse Fiord; very few specimens were obtained.

*Ectinosoma Normani*, T. & A. Scott.

1896. *Ectinosoma Normani*, T. & A. Scott, *tom. cit.* p. 435, pl. xxxvi. figs. 21, 29, 39, pl. xxxvii. figs. 12, 26, 34, 51, pl. xxxviii. figs. 5, 18, 42, 45.

This species occurred very sparingly in a gathering from Vadsö Sound—the only one in which it was observed.

*Ectinosoma finmarchicum*, sp. n.  
(Pl. I. figs. 7-13.)

An *Ectinosoma* which differs to some extent from any species known to me, and which I propose to describe under the above name, was also obtained in Vadsö Sound.

The female (fig. 7) is moderately slender and elongated and has a general resemblance to *Ectinosoma Herdmani*, T. & A. Scott, but the form and especially the armature of the fifth pair of thoracic feet differ to a considerable extent; in the present species the joints of the fifth pair (fig. 13) are rather longer in proportion to their breadth, and the inner one of the two apical setæ on the basal joint and the middle seta of the secondary joint are each of them about twice as long as the others; but in *Ectinosoma Herdmani* the terminal setæ of the fifth pair in the female are all of nearly equal

length. In *Ectinosoma finmarchicum* the form and armature of the fifth pair somewhat resemble the fifth pair in *Ectinosoma Sarsi*, Boeck, but in that species the setæ are shorter.

A form which appears to be the male of this species is somewhat smaller and stouter than the female. The specimen represented by the drawing (fig. 8) measures scarcely .9 millim., but, with the exception of the modified antennules (fig. 10), all the appendages appear to resemble more or less closely those of the female.

Both forms were apparently rare in the gathering from Vadsö Sound.

*Ectinosoma atlanticum* (Brady & Robertson).

1880. *Ectinosoma atlanticum*, G. S. Brady, *op. cit.* vol. ii. p. 13, pl. xxxviii. figs. 11-19.

A small *Ectinosoma*, which appears to be identical with the species to which I have ascribed it, was obtained rather sparingly in a gathering from Lakse Fiord—the only one in the present collection in which it was observed. The same species has been recorded from Franz-Josef Land and from various other parts of the Arctic Sea.

Genus BRADYA, Boeck, 1872.

*Bradya typica*, Boeck.

1872. *Bradya typica*, Boeck, *Nye Slægter og Arter af Saltsvands-Copepoder*, p. 15.

This well-marked species was obtained in gatherings from Bög Fiord, Lakse Fiord, and Klosterelv Fiord, but was not very common.

Genus ZOSIME, Boeck, 1872.

*Zosime typica*, Boeck.

1872. *Zosime typica*, Boeck, *op. cit.* p. 14.

This, which is also one of the more easily recognized species, occurred sparingly in gatherings from Varanger Fiord and Vadsö.

Genus TACHIDIUS, Lilljeborg.

*Tachidius discipes*, Giesbrecht (= *T. brevicornis*, Brady).

1882. *Tachidius discipes*, Giesb. *Die freilebenden Copepoden Kieler Foehrde*, p. 108, pl. ii. figs. 4 *et seq.*

This species was moderately frequent in a gathering from



Bög Fiord, but was not observed in any of the others. *T. discipes* is not uncommon as a British species, especially in inshore waters and brackish pools.

*Tachidius littoralis*, Poppe.

1885. *Tachidius littoralis*, Poppe, "Die freilebenden Copepoden des Jodebusens," Abhandl. d. nat. Ver. zu Bremen, Bd. xi. p. 167, t. vii. figs. 10-20.

A number of specimens of *Tachidius littoralis* were obtained in the same gathering with the last. The two species are quite distinct, the difference in the structure of the antennules and fifth thoracic feet in the female being very marked. *T. littoralis* is more a brackish-water species than the other, though they are frequently found living together.

Genus AMYMONE, Claus, 1863.

*Aymone sphaerica*, Claus.

1863. *Aymone sphaerica*, Claus, Die frei lebenden Copepoden, p. 14, t. xx. figs. 1-9.

A few specimens of *Aymone sphaerica* occurred in a gathering from Lakse Fiord, E. Finmark, and in another from Svolvær, Lofoten Islands. These Copepods are, from their small size and peculiar form, easily missed, unless they are carefully looked for.

Genus STENHELIA, Boeck, 1864.

*Stenhelia hirsuta*, I. C. Thompson.

1893. *Stenhelia hirsuta*, I. C. Thompson, "Revised Report on the Copepoda of Liverpool Bay," Trans. Biol. Soc. Liverpool, p. 20, pl. xxxi. (separate reprint).

This species occurred very sparingly in gatherings from Bög and Klosterelv Fiords. It has the antennules short and moderately stout, while the caudal furcæ are somewhat elongated.

*Stenhelia hyperborea*, sp. n. (Pl. II. figs. 9-13.)

*Description of the female*.—The specimen represented by the drawing (fig. 9) measures about 1.1 millim.; the body is moderately slender and the rostrum is prominent. The antennules (fig. 10) are eight-jointed; the first four joints are moderately stout, but the others are narrow; the end joint, which is longer than any of the three preceding ones, is about equal in length to the fourth. The proportional

lengths of the various joints are shown approximately by the formula:—

Numbers of the joints..	1	2	3	4	5	6	7	8
Proportional lengths ..	16	13	9	11	5	6	6	11

The antennæ have the secondary branches three-jointed, the middle joint being very small.

The mouth-organs are somewhat similar in structure to those of *Stenhelix hispida*, G. S. Brady.

In the first pair of thoracic feet (fig. 11) the outer branches, which are composed of three subequal joints, are rather longer than the third joint of the inner branches. The inner branches are comparatively short and do not greatly exceed the length of the outer ones; the first joint is about one and a third times the entire length of the second and third joints. The armature of the first pair is somewhat similar to that of the third pair of *Stenhelix hispida*. The second, third, and fourth pairs resemble the same three pairs of the species just referred to.

The fifth pair are comparatively small; the produced part of the basal joints is subtriangular in outline and furnished with five plumose setæ—three on the inner margin and two on the bluntly pointed apex. The secondary joints, which extend somewhat beyond the basal joints, are subcylindrical and nearly twice as long as broad, and they are each provided with five setæ round the distal end, as shown by the drawing (fig. 12).

The caudal furcæ are very short (fig. 13).

*Hab.* Bög Fiord and Klosterelv Fiord, rather rare.

The *Stenhelix* just described differs in the structure of the antennules and of the first and fifth thoracic feet from any species of the genus with which I am acquainted.

### Genus AMEIRA, Boeck, 1864.

#### *Ameira longipes*, Boeck.

1864. *Ameira longipes*, Boeck, Oversigt Norges Copepoder, p. 49.

This, the only species of *Ameira* observed, occurred in gatherings from Bög Fiord, Vadsö, and Varanger Fiord, but appeared to be somewhat rare.

Genus DELAVALIA, G. S. Brady, 1868.

*Delavalia robusta*, Brady & Robertson.

(Pl. I. fig. 19; Pl. II. figs. 1-3.)

1875. *Delavalia robusta*, Brady & Robertson, Brit. Assoc. Report, p. 196.

A *Delavalia* which appears to be identical with *D. robusta* was not unfrequent in gatherings from Klosterelv, Varanger, and Bög Fiords.

In the first pair of thoracic feet the inner branches, which are two-jointed and rather shorter than the outer branches, have the end joint distinctly shorter than the first one and furnished with three terminal setæ, the middle seta being plumose and rather longer and more spiniform than the one on either side.

The basal joint of the fifth pair bears on its inner aspect one very small and three elongated setæ. The secondary joint, which is subquadrate in outline, is furnished with six setæ; the three outermost and the inner setæ are elongated, but the other two are small, as shown by the drawing (fig. 3, Pl. II.).

The caudal furcæ are slender and nearly as long as the last two abdominal segments. These Arctic specimens are very similar to British specimens of the same species.

*Delavalia robusta*, var. *finmarchica*, var. n.

(Pl. I. figs. 14-18.)

This form agrees generally with *Delavalia robusta*, but differs in the following particulars:—(1) It is rather larger than the typical form; (2) the antennules (fig. 15) differ slightly in the proportional lengths of the joints; (3) the secondary joints of the fifth thoracic feet are distinctly smaller than those of *D. robusta* (fig. 17), and there is also a slight difference in their armature; but otherwise, however, this variety agrees very closely with the typical form.

*Hab.* Varanger Fiord, E. Finmark; not common.

*Delavalia mimica*, T. Scott.

1897. *Delavalia mimica*, T. Scott, Fifteenth Ann. Rep. Fishery Board for Scotland, pt. iii. p. 150, pl. i. figs. 1-9.

This species was moderately frequent in gatherings from Bög and Lakse Fiords, Vadsö Sound, and Varanger Fiord.

*Delavalia mimica* differs so markedly from the typical

species in the structure of the first pair of thoracic feet, that it should perhaps be removed from this genus to some other one.

Genus JONESIELLA, G. S. Brady, 1890.

*Jonesiella spinulosa* (Brady & Robertson).

1875. *Zosime spinulosa*, B. & R., Brit. Assoc. Rep. p. 196.

1880. *Jonesiella spinulosa*, G. S. Brady, Brit. Copep. vol. ii. p. 41, pl. xlviii. figs. 14-17, pl. xlix. figs. 14, 15.

*Jonesiella* was moderately frequent in gatherings from Vadsö Sound and Varanger Fiord. The same species has also been recorded from Franz-Josef Land and other parts of the Arctic seas.

Genus CERVINIA, Norman.

*Cervinia Bradyi*, Norman.

1878. *Cervinia Bradyi*, Norman, Brady's Brit. Copep. vol. i. p. 86, pl. xxiv. A, figs. 3-13.

A single specimen of this rare and somewhat curious species was obtained in Bög Fiord, and was the only one observed in this Finmark collection. *Cervinia Bradyi* was discovered by the Rev. A. M. Norman at Oban in 1876, and has since then been obtained in several places both in England and Scotland; but seldom more than one or two specimens are noticed in any single gathering.

Genus CANTHOCAMPTUS, Westwood, 1836.

*Canthocamptus parvus*, T. & A. Scott.

1896. ? *Canthocamptus parvus*, T. & A. Scott, Ann. & Mag. Nat. Hist. (6) vol. xviii. p. 6, pl. ii. figs. 14-22.

This small species was obtained in Bög Fjord, but was apparently very rare. *Canthocamptus parvus* has been very sparingly observed near Cape Flora in Franz-Josef Land, as well as in a few places in Scotland.

Genus ATTHEYELLA, Brady, 1840.

*Attheyella arctica* (Lilljeborg) \*.

(Pl. II. figs. 14-19; Pl. III. figs. 1, 2.)

1902. *Canthocamptus arcticus*, Lillj. Kongl. Svenska Vetensk.-Akad. Handl. B. xxxvi. No. 1, p. 37, t. ii. fig. 23, t. iii. figs. 1-4.

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\* This species was described and figured by me under the name of *Canthocamptus finmarchicus*, and the MS. for the printer had passed out of my hands when, on October 3rd, I received Lilljeborg's paper, and I have much pleasure in substituting his name for the one I had adopted.



*Description of the female.*—Length about .74 millim. ( $\frac{1}{34}$  of an inch). Its general appearance is that of a small *Canthocamptus*. The antennules are moderately short and composed of eight joints; the first four are somewhat dilated, while the four end joints are rather slender; the fourth and fifth joints, which are subequal in length, are shorter than the others (fig. 15).

The antennæ are furnished with short and apparently one-jointed secondary branches.

The various mouth-organs resemble somewhat those of *Attheyella pygmæa* (G. O. Sars).

In the first pair of thoracic feet the inner branches, which are about equal in length to the outer, consist of two joints; the end joint is rather narrower and shorter than the proximal one, and is furnished with a moderately long and slender terminal spine and two setæ, one being very long and slender and one (the innermost) very short; a short spiniform seta also springs from near the end of the inner margin of the proximal joint (fig. 16); both joints have a fringe of minute hairs on the outer margin. The outer branches are moderately stout and composed of three subequal joints; their armature is somewhat similar to that of the outer branches of the first pair in *Attheyella pygmæa*.

The second and third pairs are somewhat similar to each other in structure; the outer branches consist of three and the inner of two joints; the first joint of the inner branches is very short and moderately stout; the second joint is narrower and tapers towards the distal extremity, which reaches to near the end of the second joint of the outer branches; this end joint bears two coarsely-feathered terminal setæ, one being short and spine-like and one very long and slender. In the second pair the second joint of the inner branches appears also to carry one small hair on the lower half of the inner margin (fig. 17), while the same joint of the inner branches of the third pair carries two setæ similarly situated; in this pair the terminal spine is also stouter than the terminal spine of the second pair (fig. 18). The structure of the outer branches is somewhat like that of the outer branches of the first pair, but a small seta springs from near the middle of the inner margin of the third joint; moreover, the terminal spine of the end joint is very long, and a very long and slender seta also springs from the inner distal angle of the same joint. In the fourth pair the inner branches, which are very short and scarcely reach to the end of the first joint of the outer branches, have the proximal joint extremely small, while the end joint, which is the longer of the

two, appears to be furnished with four terminal setæ, as shown by the drawing (fig. 1, Pl. III.); the outer three-jointed branches are also moderately stout.

In the fifth pair the inner produced part of the basal joint is moderately broad and has the abruptly and somewhat irregularly rounded apex provided with six setæ; the three innermost setæ are considerably elongated, the next two are moderately short, while the outermost is very small; the space between the two middle setæ is rather greater than that between the others, so that the setæ appear as if they were arranged into two groups with three setæ in each; the secondary joints, which extend slightly beyond the inner produced portion of the basal joints, are broadly ovate, the breadth being equal to about three fourths of the length, and they are furnished with five setæ round the outer distal margin and end; the setæ vary in length, but the middle one is the shortest (fig. 2, Pl. III.). The furcal joints are not longer than the last abdominal segment and are somewhat wide apart.

*Hab.* Pools at Kirkenes, E. Finmark; apparently not very rare.

This species, which I have ascribed to the genus *Attheyella*, while differing from any that are known to me, seems to combine the characters of several: one of its nearest allies appears to be the *Canthocamptus rhaeticus* of Schmeil\* (= *Attheyella MacAndrewæ*, T. & A. Scott)†; but the peculiar structure of the inner branches of the first four pairs of feet and the somewhat different form of the fifth pair are sufficient for its separation from that or any other nearly allied form.

## Genus TETRAGONICEPS, G. S. Brady.

### *Tetragoniceps incertus*, T. Scott.

1892. *Tetragoniceps incertus*, T. Scott, Tenth Ann. Rep. Fishery Board for Scotland, pt. iii. p. 254, pl. xii. figs. 1-17.

This species was only observed in a gathering from Lakse Fiord, and appeared to be extremely rare; but it is small and of a slender form and easily overlooked.

\* "Copepoden d. Rhälikon Gebirges," Abhandl. d. natur. Ges. zu Halle, Bd. xix. p. 23, Taf. ii. (1893).

† Ann. & Mag. Nat. Hist. (6) vol. xv. p. 457, pl. xvi. figs. 1-6 (1895).

Genus LAOPHONTE, Philippi.

*Laophonte horrida*, Norman.

1876. *Laophonte horrida*, Norman, "Report 'Valorous' Exped.," Proc. Roy. Soc. vol. xxv. p. 206.

Several specimens of this well-marked species were obtained in gatherings from Lakse Fiord and Varanger Fiord. The species was recorded from the Arctic seas by Buchholz in his Report on the North German Expedition, 1869-70, under the name of *Cyclops minuticornis*, O. F. Müller; and it was also collected by Mr. W. S. Bruce in Franz-Josef Land, as well as near Bear and Hope Islands, Spitzbergen.

*Laophonte inopinata*, T. Scott.

1892. *Laophonte inopinata*, T. Scott, Tenth Ann. Rep. Fishery Board for Scotland, pt. iii. p. 256, pl. xi. figs. 1-11.

The only gathering in which this species was observed was collected between tide-marks at Vadsö, and it was apparently very rare.

*Laophonte depressa*, T. Scott.

1894. *Laophonte depressa*, T. Scott, Twelfth Ann. Rep. Fishery Board for Scotland, pt. iii. p. 245, pl. vi. figs. 24-31, pl. vii. figs. 1-3.

This, like *Laophonte inopinata*, was found only in one gathering, viz., that from Bög Fiord, and it appeared also to be very rare. This species was also collected by W. S. Bruce at Franz-Josef Land in 1896-97.

*Laophonte perplexa*, T. Scott.

1899. *Laophonte perplexa*, T. Scott, "Crust. from Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxvii. p. 98, pl. v. fig. 14, pl. vi. figs. 7-11.

This species occurred with moderate frequency in gatherings from Bög Fiord, Vadsö Sound, and Varanger Fiord.

*Laophonte thoracica*, Boeck.

1863. *Laophonte thoracica*, Boeck, Oversigt Norges Copepoder, p. 54.

One or two specimens which I ascribe to this species were obtained in a gathering from Bög Fiord, but it was observed in none of the other gatherings.

Genus ANCORABOLUS, Norman.

*Ancorabulus mirabilis*, Norman.

A few specimens of this remarkable species were obtained  
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in a gathering from Varanger Fiord. *Ancorabolutus mirabilis* was observed many years ago by the Rev. A. M. Norman along with one or two other curious forms in a gathering of Clyde Crustacea; drawings of these forms were prepared, and these, with suitable descriptions, would have been published ere this time, but the stress of other work has delayed this being done; it is expected, however, that these descriptions and drawings will now soon be ready for publication. The occurrence of this strange form in the Arctic seas as well as in the Firth of Clyde suggests that its distribution may be more general and diffused than has been observed hitherto. The extremely spiny armature of the carapace tends to collect around the animal a coating of mud, which helps to conceal it and prevent its recognition.

### Genus CLETODES, Brady, 1872.

#### *Cletodes hirsutipes*, T. Scott.

1897. *Cletodes hirsutipes*, T. Scott, Fifteenth Ann. Rep. Fishery Board for Scotland, pt. iii. p. 171, pl. vii. figs. 11-18.

This species occurred very sparingly in gatherings from Vadsö and Varanger Fiord.

#### *Cletodes curvirostris*, T. Scott.

1894. *Cletodes curvirostris*, T. Scott, Twelfth Ann. Rep. Fishery Board for Scotland, pt. iii. p. 250, pl. viii. figs. 18-24.

A single specimen of *Cletodes curvirostris* was observed along with the species just recorded in the gathering from Varanger Fiord, and this was the only gathering in which it was noticed.

#### *Cletodes varians*, T. Scott, sp. n. (Pl. III. figs. 7-11.)

*Description of the female.*—The body is narrow and cylindrical in form; the first two segments of the abdomen appear to be coalescent and the last is armed with a small dorsal tooth (fig. 7); the rostrum is small; the caudal furcæ are moderately elongated and about equal to the combined lengths of the last two abdominal segments. The specimen represented by the drawing measures about  $\cdot 6$  millim. ( $\frac{1}{40}$  of an inch) in length.

The antennules are short and composed of five joints; four of the joints are of moderate size, but the penultimate one is small; the last three joints are provided with a few somewhat stout and coarsely plumose and plain setæ (fig. 8).



The antennæ and mouth-organs are similar to those of *Cletodes tenuipes*, T. Scott.

The first pair of thoracic feet have the outer branches moderately elongated and three-jointed, but the inner branches appear to be rudimentary; they each consist of a minute rounded process, which may be articulated to the basal joint, but, if so, the articulation is indistinct; a single short seta is the only armature observed on these rudimentary branches (fig. 9). In the second, third, and fourth pairs the outer branches, which are three-jointed, are somewhat similar to the outer branches of the first pair, but are rather more elongated; the inner branches are apparently entirely obsolete.

The fifth pair, which somewhat resembles the fifth pair of *Cletodes tenuipes*, has the basal joint small, slightly produced interiorly, and furnished with two apical setæ; the secondary joint is narrow and elongated, being about six times longer than broad, and bears one seta near the middle of the outer margin and other four near the distal end and apex, as shown by the drawing (fig. 10).

The male has a general resemblance to the female, but the antennules are modified for grasping, and the fifth pair of thoracic feet are extremely small (fig. 11).

*Hab.* Bög Fiord; rare.

This species is in some respects similar to the form to be next described, but differs in having the inner branches of the first four pairs of thoracic feet rudimentary or wanting.

*Cletodes tenuipes*, T. Scott, var.  
(Pl. II. fig. 20; Pl. III. figs. 3-6.)

1897. *Cletodes tenuipes*, T. Scott, Fifteenth Ann. Rep. Fishery Board for Scotland, pt. iii. p. 170, pl. i. figs. 19-27.

This species, which is comparatively small, was obtained in the same gathering with the last. The length of the specimen represented by the drawing (fig. 3, Pl. III.) is only about .56 millim. (scarcely  $\frac{1}{45}$  of an inch). The species was first described from Clyde specimens, but has since been obtained on other parts of the Scottish coasts. In these East Finmark specimens one or two apparently slight differences are noticed. They have usually, for example, a straight outline, whereas the specimens from the Scottish seas, when seen from the side, are almost invariably incurved; the inner branches of the second, third, and fourth pairs of thoracic feet appear also to be rather smaller (fig. 5, Pl. III.), and

the secondary branches of the fifth pair are narrow and sub-cylindrical (fig. 6, Pl. III.).

The antennules (fig. 20, Pl. II.), which resemble very closely those of *C. varians*, are short and moderately stout, and composed of five joints, the penultimate joint being very small, and they are also sparingly setiferous. The antennæ and mouth-organs are apparently similar in structure to the same appendages in Scottish specimens of *Cletodes tenuipes*; so also are the first pair of thoracic feet (fig. 4, Pl. III.). In the next three pairs the inner branches, as already remarked, are rather smaller, and the secondary branches of the fifth pair are also slightly different; but these differences do not appear to be of sufficient importance to be of specific value.

*Cletodes perplexa*, T. Scott.

1899. *Cletodes perplexa*, T. Scott, Seventeenth Ann. Rep. Fishery Board for Scotland, pt. iii. p. 257, pl. xi. figs. 12-20, pl. xii. fig. 1.

This curious species occurred very sparingly in a gathering from Bög Fiord, the only one in which it was observed. *C. perplexa*, which has not till now been recorded out of Scotland, is readily distinguished by the form of the fifth thoracic feet, and that even without dissection.

*Cletodes lata*, T. Scott.

1892. *Cletodes lata*, T. Scott, Tenth Ann. Rep. Fishery Board for Scotland, pt. iii. p. 257, pl. x. figs. 10-18.

The gathering in which this species was obtained was collected in Klosterelv Fiord. I find no previous record of this *Cletodes* from the Arctic seas. In general appearance it is not unlike *Cletodes similis*, but it differs from that species in some details of structure, and especially in the form of the fifth thoracic feet in the female.

\* *Cletodes similis*, T. Scott.

1895. *Cletodes similis*, T. Scott, Thirteenth Ann. Rep. Fishery Board for Scotland, pt. iii. p. iii. figs. 22-26, pl. iv. figs. 1-3.

This species was observed in a gathering from Svolvær, Lofoten Islands, the only gathering in which it was noticed. It is one of the species collected by Mr. Bruce at Franz-Josef Land and also to the eastward of Spitzbergen. Only one or two specimens occurred in the Svolvær gathering.

Genus *PLATYCHELIPUS*, G. S. Brady, 1880.

*Platychelipus littoralis*, G. S. Brady.

1880. *Platychelipus littoralis*, G. S. Brady, Brit. Copep. vol. ii. p. 103, pl. lxxix. figs. 20-23, pl. lxxx. fig. 15.

The only gathering in which this species occurred was from Bög Fiord, and very few specimens were observed. *Platychelipus* was collected by W. S. Bruce, along with *Nannopus palustris*, G. S. Brady, on the east side of Kolguev Island, while cruising in Mr. Coates's yacht the 'Blencathra.'

Genus *DACTYLOPUS*, Claus, 1863.

*Dactylopus tisboides*, Claus.

1863. *Dactylopus tisboides*, Claus, Die frei lebenden Copepoden, p. 127, pl. xvi. figs. 24-28.

This species was of frequent occurrence in gatherings from Bög Fiord, Lakse Fiord, Vadsö, between tide-marks, Vanger Fiord, East Finmark; and also from Svolvær, Lofoten Islands. There appeared to be two forms, and the one which was the more common of the two had pellucid markings along the outer margins both of the secondary joint and of the inner produced part of the basal joint of the fifth pair of thoracic feet; similar to specimens of the same species collected by Mr. Bruce at Franz-Josef Land (Journ. Linn. Soc., Zool. vol. xxvii. p. 104, 1899).

*Dactylopus longirostris*, Claus.

1863. *Dactylopus longirostris*, Claus, *op. cit.* p. 127, pl. xvii. figs. 4-6.

A few specimens apparently belonging to this species occurred in gatherings from Bög Fiord and Vadsö Sound. One or two specimens were observed in the gathering from Vadsö, which, though differing from the typical *D. longirostris*, resemble that species very closely in their general structure, and I propose to describe them under the following varietal name:—

*Dactylopus longirostris*, Claus, var. *finmarchicus*.

(Pl. II. figs. 4-8.)

The specimen represented by the drawing (fig. 4) measures about .8 millim. long. The rostrum is prominent. The antennules are slender and elongated and composed of eight joints; the first, second, fourth, and last are subequal in length and considerably longer than the others, while the fifth

is very small (fig. 5). The antennæ and mouth-organs are similar to those of *D. longirostris*.

The first pair of thoracic feet (fig. 6) are moderately stout; the outer branches, which are composed of three nearly equal joints, are about as long as the first joint of the inner branches, the spines on the outer margins are elongated and slender, and the second joint bears a plumose seta on the inner distal angle; the length of the first joint of the inner branches is equal to about twice the length of the second and third combined, but the second joint is very small; the armature of the inner branches is similar to that of the same branches in typical specimens of *D. longirostris*. The next three pairs of thoracic feet are somewhat similar to those of the typical form, but the fifth pair seems to differ in one or two particulars; the inner produced part of the basal joint in this pair is broadly subcylindrical and the obliquely truncated apex is furnished with five plumose setæ; the two outermost setæ spring from the outer angle and are close together, but the others are more widely apart; the secondary joint is broadly ovate and extends somewhat beyond the end of the basal joint; the armature of this joint consists of the same number of setæ as on the secondary joint of the same pair in *D. longirostris* (fig. 7). The furcal joints (fig. 8) are very short.

*Hab.* Vadsö Sound; rare.

It will be observed that this form, while agreeing generally with the typical *D. longirostris*, Claus, has the first pair of thoracic feet proportionally stouter and shorter, and the outer branches are about as long as the first joint of the inner ones, and the fifth pair are more broadly foliaceous; but though these differences are fairly well marked, they can scarcely be considered of specific value.

*Dactylopus tenuiremis*, Brady & Robertson.

1875. *Dactylopus tenuiremis*, Brady & Robertson, Brit. Assoc. Report, p. 197.

This species occurred very sparingly in gatherings from Bög Fiord, Lakse Fiord, and Vadsö Sound. It has also been collected in the Arctic seas by Mr. Bruce.

(?) *Dactylopus brevicornis*, Claus.

1866. *Dactylopus brevicornis*, Claus, Die frei lebenden Copepoden von Nizza, p. 29, t. iii. figs. 20-25.

One or two specimens apparently belonging to this small species were collected in Bög Fiord and Vadsö Sound.



*Dactylopus Strömii* (Baird), var. *arcticus*, T. Scott.  
(Pl. IV. figs. 1-7.)

1899. *Dactylopus Strömii* (Baird), var. *arcticus*, T. Scott, "Crust. from Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxvii. p. 106, pl. v. figs. 11-17.

Several female specimens of this variety were obtained in gatherings from Bög Fiord and Vadsö Sound. In this variety the antennules are nine-jointed; the posterior foot-jaws appear to be more hirsute than in the typical form, and the first and fifth thoracic feet are somewhat similar to the same appendages in *D. similis*, Claus.

One or two male specimens apparently belonging to the same variety were also obtained in the gathering from Bög Fiord, and as no special mention was made to the male form in the original description of the variety in my "Report on the Franz-Josef Land Crustacea" referred to above, I will here glance briefly at a few of the more important characters by which it is distinguished from the female. It differs from the female in having the antennules modified as shown in the drawing (fig. 2). The second pair of thoracic feet have the inner branches apparently two-jointed; the first joint is very short, but the second is elongated and narrow except at the base, where it is dilated on the outer aspect; this joint, which reaches to near the end of the outer branches, bears on the dilated basal part a stout spine-like appendage that reaches to the end of the joint, as shown in the drawing (fig. 5), while the end of the joint itself terminates in what looks like a recurved bifid process, which has one branch of the fork elongated and slender, extending to near the base of the joint, but the other branch is short; the spines on the outer distal angles of the joints of the outer branches of the second pair of feet are also moderately stout—proportionally more so than in the female.

The fifth feet (fig. 6) are small; the inner part of the basal joint, which is only slightly produced and rounded, is armed with three small spines; the secondary joint is broadly ovate and is furnished with a few marginal and terminal setæ, as shown by the figure.

The specimen represented by the drawing (fig. 1) measured about a millimetre in length.

Genus *THALESTRIS*, Claus, 1863.

*Thalestris helgolandica*, Claus.

1863. *Thalestris helgolandica*, Claus, Die frei lebenden Copepoden, p. 131, t. xvii. figs. 12-21.

A number of specimens of this *Thalestris* were obtained in gatherings from Bög Fiord, East Finmark, and Svolvær, Lofoten Islands.

*Thalestris polaris*, T. Scott.

1899. *Thalestris polaris*, T. Scott, "Crust. from Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxvii. p. 106, pl. vii. figs. 8-16.

This species occurred in gatherings from Bög Fiord, Lakse Fiord, Vadsö, between tide-marks, and Varanger Fiord.

*Thalestris Jacksoni*, T. Scott.

1899. *Thalestris Jacksoni*, T. Scott, *op. cit.* p. 109, pl. viii. figs. 3-9.

A single specimen of this fine species was obtained in a gathering collected between tide-marks at Vadsö. This species attains to at least one tenth of an inch in length.

*Thalestris Clausii*, Norman.

1868. *Thalestris Clausii*, Norman, Brit. Assoc. Report, p. 297.

A single female specimen was observed in the Finmark collection; it occurred in a gathering from Lakse Fiord.

The fifth pair of feet in this specimen are foliaceous; the basal joint is subtriangular, with a somewhat broadly but irregularly rounded apex, which reaches to about the end of the secondary joint and is furnished with six moderately short and plumose setæ round the lower inner margin and end, but the first seta, counting from the inner margin, is rather shorter and more coarsely plumose, and the space between it and the next seta is greater than that between any of the others; moreover, the fourth seta, still counting from the inside, is rather more slender than the other five; the secondary joint is broadly ovate, the breadth being equal to about two thirds of the length; this joint is furnished with six setæ on the lower outer margin and apex; the basal part of each of the three uppermost setæ on the outer margin and the innermost apical seta is comparatively stout, but they become very slender towards the end; the remaining two setæ, which are near the apex and are closer to each other at the base than they are to those on either side, are rather longer and more slender than the other four. Both the inner and the outer margins of the secondary joint are ciliated. Prof. G. S. Brady, in his 'Monograph of the British Copepoda,' states that this is perhaps the most common of

the British species belonging to the genus *Thalestris*; but there does not seem to be much known respecting its distribution outside the British area.

*Thalestris longimana*, Claus. (Pl. IV. figs. 8–13.)

1863. *Thalestris longimana*, Claus, Die frei lebenden Copepoden, p. 130, t. xviii. figs. 1–11.

A single specimen of *Thalestris longimana* was obtained in the Varanger Fiord gathering. The dissections represented by the drawings have been carefully compared with similar dissections of Scottish specimens, and the only important difference observed was in the basal and secondary joints of the fifth pair of thoracic feet. In the specimen from Varanger Fiord the basal and secondary joints of the fifth pair (fig. 12) are not so broadly foliaceous, both branches being of a more cylindrical form; but this difference may be only accidental or due, perhaps, to the specimen being scarcely mature. The antennules (fig. 9) and the second maxillipeds (fig. 10) are identical with the same appendages in Scottish specimens. In the second maxillipeds the inner concave part of the hand has the same minutely tuberculated surface peculiar to that species; the general form of the hand is also exactly similar. *Th. longimana*, which was first recorded by Prof. Claus from Heligoland, has a distribution apparently coextensive with the British Islands; it was recorded by the Rev. A. M. Norman in 1869 from Bressay, Shetland\*, and from various other places around our shores by Prof. G. S. Brady† and others. Its occurrence in the gathering from Varanger Fiord extends its distribution to the Arctic seas.

*Thalestris Normani*, sp. n. (Pl. III. figs. 12–18.)

This *Thalestris* closely resembles *Thalestris frigida*, T. Scott, in its general appearance and size, but differs from that species in several details of structure. The following is a brief description of the species:—

(1) *The female*.—The antennules of the female are composed of nine joints; the first four, which gradually decrease in length, are together about twice the length of the remaining five joints; the fifth, seventh, and eighth joints are smaller than any of the others (fig. 13).

\* "Last Report on Dredging among the Shetland Isles," Brit. Assoc. Report for 1868 (published 1869), p. 297.

† Brit. Copep. vol. ii. p. 136 (1880).

The antennæ are furnished with three-jointed secondary branches.

The second maxillipeds and other mouth-organs are somewhat similar to those of *Thalestris frigida*.

The first pair of thoracic feet are moderately short and stout and the outer branches are distinctly shorter than the inner ones (fig. 14); the spiniform seta on the outer distal angle of the second basal joint is comparatively large, but the spine on the inner distal angle is considerably smaller; the terminal claw of the inner branches is very long and slender and the plumose seta which springs from near the middle of the inner margin of the second joint is also elongated; the general structure and armature of both branches resemble those of the first pair in *Thalestris robusta*, Claus, while the second, third, and fourth pairs are somewhat similar to those of *Thalestris frigida*.

The fifth pair (fig. 15) have also a general resemblance to the fifth pair of that species, but the basal joint is proportionally rather broader at the base, and its armature is somewhat differently arranged; the arrangement of the armature of the secondary joint is also somewhat different from that of the secondary joints of the species referred to.

The caudal furcæ are very short.

(2) *The male*.—The male resembles the female, but is rather smaller. The antennules have a modified structure to fit them for grasping. The spine on the inner distal angle of the second basal joints of the first pair of thoracic feet is strong and distinctly hooked at the end, as shown in Pl. III. fig. 14 a.

The inner branches of the second pair of feet resemble generally the same branches in the male of *Thalestris frigida*, but they are distinctly broader in proportion to their length, and there is a slight difference in their armature, as shown in the drawing (fig. 16).

The fifth pair also resemble somewhat those of the male of the species referred to, especially in their armature, but the inner produced part of the basal joint is less prominent and more broadly rounded and the secondary joint is rather smaller (fig. 17).

*Hab.* Bög Fiord; not very common.

This *Thalestris* comes very near *Th. frigida*, and I was at first inclined to regard it as belonging to that species; but it was found that the difference in the structure of the first pair of thoracic feet in both the male and female and of the inner branches of the second pair in the male was alone sufficient to distinguish it from the species referred to. The structure of



the first pair is in some respects not unlike that of *Th. robusta*, Claus, from Nice and Messina †, but the fifth pair in form and armature is decidedly different. It may be further remarked that the structure of the first pair of feet in both of the species named exhibits a close resemblance to that of the first pair in certain species of *Dactylopus*, so that the species may be almost considered a connecting-link between the two genera *Thalestris* and *Dactylopus*.

Genus PSEUDOTHALESTRIS, G. S. Brady, 1883.

*Pseudothalestris major* (T. & A. Scott).

1895. *Pseudowestwoodia major*, T. & A. Scott, Ann. & Mag. Nat. Hist. (6) vol. xv. p. 56, pl. vi. figs. 17-30.

This small species was moderately frequent in a gathering collected between tide-marks at Vadsö; but it was not observed in any of the other Finmark gatherings.

Four British species of *Pseudothalestris* have been described—the first in 1894 in the Twelfth Ann. Report of the Fishery Board for Scotland, pt. iii. p. 257, pl. xi. figs. 21-29, under the name of *Pseudowestwoodia Andrewi*, T. Scott: descriptions of other two species by T. & A. Scott were published in the Ann. & Mag. Nat. Hist. for January 1895 under the names of *Pseudowestwoodia pygmæa* and *major*; in the 'Annals' for the following month of June (p. 463) these authors withdrew the name *Pseudowestwoodia*, T. Scott, in favour of *Pseudothalestris*, G. S. Brady, as it was found that the two genera were identical and that the latter name had been published several years before the other. The description of the fourth species by Prof. G. S. Brady was published early in 1901 in Nat. Hist. Trans. N. D. & N. C. vol. xiv. p. 59, pl. iii. figs. 11-16, under the name of *Pseudothalestris monensis*, from specimens obtained at Port Erin, Isle of Man. *Pseudothalestris major* has not previously been recorded from the Arctic seas.

Genus WESTWOODIA, Dana.

\* *Westwoodia nobilis* (Baird).

1845. *Arpacticus nobilis*, Baird, Trans. Berw. Nat. Club, vol. ii. p. 155.

This pretty little species resembles very closely the British species of *Pseudothalestris*, but differs distinctly in the structure of the first pair of thoracic feet. It was of rare

† Die frei lebenden Copepoden, p. 129, t. xviii. figs. 17-23, t. xix. fig. 1.

occurrence in the present collection; the only gathering in which the species was observed was from Svolvær, Lofoten Islands, and only one or two specimens were noticed.

Genus *HARPACTICUS*, H. M.-Edw., 1838.

*Harpacticus chelifera* (O. F. Müller), var. *arcticus*, Poppe.

1884. *Harpacticus chelifera*, var. *arcticus*, Poppe, "Stillen Ocean u. Behrings Meer freileb. Copep.," Arch. f. Naturgesch. 50 Jahrg. i. Bd. p. 296, t. xxiii. figs. 1, 2, 4-7, t. xxiv. figs. 1-7, 9, 10.

This Harpactid was obtained in gatherings from Bög Fiord, Lakse Fiord, Vadsö, and Varanger Fiord, E. Finmark; and from Svolvær, Lofoten Islands. Most of the specimens appeared to belong to the variety *arcticus*, Poppe.

Genus *ZAUS*, Goodsir, 1845.

*Zaus aurelii*, Poppe.

1884. *Zaus aurelii*, Poppe, *op. cit.* p. 286, t. xx. figs. 7-9, t. xxi. figs. 5-15.

A good number of specimens of *Zaus*, all of which were apparently referable to *Z. aurelii*, were obtained in gatherings from Bög Fiord, Lakse Fiord, Vadsö, and Svolvær.

Genus *IDYA*, Philippi, 1843.

*Idya furcata* (Baird).

1837. *Cyclops furcata*, Baird, Mag. Zool. & Bot. vol. i. p. 330, t. ix. figs. 26-28.

*Idya* was moderately common in Bög Fiord and Lakse Fiord and sparingly in one or two other gatherings. Though the specimens were all more or less carefully examined, there appeared to be only the one species represented.

Fam. *Lichomolgidae*.

Genus *HERRMANELLA*, Canu, 1891.

? *Herrmanella finmarchica*, sp. n.  
(Pl. IV. figs. 14-19.)

The form described under this name was collected in Bög Fiord; there were very few specimens in the gathering, and they were all more or less damaged.

The specimen represented by the drawing (fig. 14)

measured about 1.3 millim. ( $\frac{1}{19}$  of an inch) in length and had a general resemblance to *Lichomolgus*.

The antennules, which were imperfect, are moderately short and composed of six (or seven) joints, but only five were present (fig. 15); the third joint is small, but the others are of moderate length.

The mandibles and maxillæ were not observed.

Both pairs of maxillipeds are small; the end joints of the first maxillipeds are furnished on the upper aspect with two moderately long setæ and a few minute spines; one seta springs from near the base of the joint, but the other is subterminal; both setæ appear to be ciliated along one side, as shown by the drawing (fig. 17). The second pair of maxillipeds have the end joints armed with a small but stout terminal claw, in addition to one or two small spines (fig. 18).

All the four pairs of swimming-feet are moderately short and stout and have both branches three-jointed and of nearly equal length.

In the first pair the first and second joints of the outer branches are each furnished with a stout spine on the outer margins, and there is also a seta on the inner margin of the second joint, but not on the first; the end joint bears four spines on the outer margin and apex and four setæ on the inner margin. The first two joints of the inner branches have each a seta on the inside margin, while externally their distal angles form each a small tooth-like process; the end joint of the inner branches is armed with a stout subterminal spine on its outer aspect and with five setæ on its inner margin (fig. 19); all the setæ appear to be plumose.

The other three pairs are somewhat similar to the first, but differ to some extent in the armature chiefly of the end joints. In the second pair the only apparent difference is that the end joints of the outer branches are furnished interiorly with five instead of four setæ, while the end joints of the inner branches are each furnished with three spines on the outer and three setæ on the inner margin. The armature of the third pair appears to be similar to that of the second. In the fourth pair the second joint of the outer branches bears two setæ on the inner margin, while the end joint is armed with three spines and three setæ; the only difference observed in the armature of the inner branches is in the end joints being provided with three slender spines and two setæ.

The fifth pair are small and apparently only one-jointed (fig. 14).

The genital segment, which is composed of two coalesced

segments, is moderately dilated and rather more than half the entire length of the abdomen.

The caudal furcæ are slender and elongated, their length being somewhat greater than that of the last two abdominal segments combined.

*Hab.* Bög Fiord; apparently rare.

The species is provisionally ascribed to the genus *Herrmanella* of Canu\*; the second maxillipeds are, however, more feebly clawed than those of any of the species already described, and because of this and one or two other differences this East Finmark form should, perhaps, be placed in another genus; but it will be necessary to have more perfect specimens ere its position can be satisfactorily determined.

#### EXPLANATION OF THE PLATES.

##### PLATE I.

###### *Cyclopina Schneideri*, sp. n.

- Fig.* 1. Female, dorsal view,  $\times 53$ . 2. One of the antennules,  $\times 144$ .  
3. One of the antennæ,  $\times 120$ . 4. Mandible and palp,  $\times 216$ .  
5. Foot of first pair,  $\times 144$ . 6. Foot of fifth pair,  $\times 180$ .

###### *Ectinosoma finmarchicum*, sp. n.

- Fig.* 7. Female, seen from the side,  $\times 53$ . 8. (?) Male, seen from the side,  $\times 53$ . 9. One of the female antennules,  $\times 270$ . 10. One of the male antennules,  $\times 180$ . 11. One of the antennæ,  $\times 180$ . 12. Foot of fifth pair, male,  $\times 270$ . 13. Foot of fifth pair, female,  $\times 180$ .

###### *Delavalia robusta*, Brady & Robertson, var. *finmarchica*, nov.

- Fig.* 14. Female, seen from the side,  $\times 53$ . 15. One of the antennules,  $\times 180$ . 16. Foot of first pair,  $\times 180$ . 17. Foot of fifth pair,  $\times 240$ . 18. Part of abdomen and caudal furca,  $\times 105$ .

###### *Delavalia robusta*, Brady & Robertson.

- Fig.* 19. Part of abdomen and caudal furca, enlarged.

##### PLATE II.

###### *Delavalia robusta*, Brady & Robertson.

- Fig.* 1. One of the antennules,  $\times 180$ . 2. Foot of first pair,  $\times 180$ .  
3. Foot of fifth pair,  $\times 240$ .

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\* "Les Copépodes marins du Boulonnais," Bull. Scientifique de la France et de la Belgique, p. 480 (1891).



*Dactylopus longirostris*, Claus, var. *finmarchicus*, nov.

Fig. 4. Female, seen from the side,  $\times 53$ . 5. One of the antennules,  $\times 180$ . 6. Foot of first pair,  $\times 135$ . 7. Foot of fifth pair,  $\times 180$ . 8. Part of abdomen and caudal furca, enlarged.

*Stenkelia hyperborea*, sp. n.

Fig. 9. Female, seen from the side,  $\times 39$ . 10. One of the antennules,  $\times 180$ . 11. Foot of first pair,  $\times 135$ . 12. Foot of fifth pair,  $\times 180$ . 13. Part of abdomen and caudal furca, enlarged.

*Attheyella arctica*, Lilljeborg.

Fig. 14. Female, seen from the side,  $\times 37$ . 15. One of the antennules,  $\times 270$ . 16. Foot of first pair,  $\times 240$ . 17. Foot of second pair (inner and part of outer branches),  $\times 240$ . 18. Foot of third pair (inner and part of outer branches),  $\times 240$ . 19. Part of abdomen and caudal furca, enlarged.

*Cletodes tenuipes*, T. Scott, var.

Fig. 20. Antennule, female,  $\times 540$ .

### PLATE III.

*Attheyella arctica*, Lilljeborg.

Fig. 1. Foot of fourth pair,  $\times 140$ . 2. Foot of fifth pair,  $\times 140$ .

*Cletodes tenuipes*, T. Scott, var.

Fig. 3. Female, dorsal view,  $\times 79$ . 4. Foot of first pair,  $\times 540$ . 5. Foot of fourth pair,  $\times 360$ . 6. Foot of fifth pair,  $\times 360$ .

*Cletodes varians*, sp. n.

Fig. 7. Female, seen from the side,  $\times 106$ . 8. One of the antennules,  $\times 432$ . 9. Foot of first pair,  $\times 270$ . 10. Foot of fifth pair (female),  $\times 270$ . 11. Foot of fifth pair (male),  $\times 540$ .

*Thalestris Normani*, sp. n.

Fig. 12. Female, seen from the side,  $\times 40$ . 13. One of the antennules,  $\times 180$ . 14. Foot of first pair,  $\times 135$ . 14a. Spine on inner distal angle of second basal joint of first pair (male),  $\times 135$ . 15. Foot of fifth pair (female),  $\times 135$ . 16. Inner branch of second foot (male),  $\times 135$ . 17. Foot of fifth pair (male),  $\times 180$ . 18. Part of abdomen and caudal furca, enlarged.

### PLATE IV.

*Dactylopus Strömii* (Baird), var. *arcticus*, T. Scott (male).

Fig. 1. Male, seen from the side,  $\times 53$ . 2. One of the male antennules,  $\times 180$ . 3. One of the second maxillipeds,  $\times 270$ . 4. Foot of first pair,  $\times 105$ . 5. Foot of second pair,  $\times 180$ . 6. Foot of fifth pair,  $\times 180$ . 7. Part of abdomen and caudal furca, enlarged.

*Thalestris longimanus*, Claus.

Fig. 8. Female, seen from the side,  $\times 40$ . 9. One of the antennules,  $\times 135$ . 10. One of the second maxillipeds,  $\times 105$ . 11. Foot of first pair,  $\times 105$ . 12. Foot of fifth pair,  $\times 158$ . 13. Part of abdomen and caudal furca, enlarged.

(?) *Herrmanella finmarchica*, sp. n.

Fig. 14. Female, dorsal view,  $\times 40$ . 15. One of the antennules (imperfect),  $\times 108$ . 16. One of the antennæ (imperfect),  $\times 108$ . 17. One of the first maxillipeds,  $\times 220$ . 18. One of the second maxillipeds,  $\times 146$ . 19. Foot of first pair,  $\times 154$ .

II.—*A Revision of the Genera of the ARANEÆ or Spiders, with Reference to their Type Species.* By F. PICKARD-CAMBRIDGE, B.A., F.Z.S.

THE following notes contain the conclusions which have been reached as to the species which, on consistent principles of settlement, ought to be regarded as the types of the various genera dealt with.

The genera include those published by Menge in Preuss. Spinn. 1866–78, by J. H. Emerton in Trans. Conn. Acad. vol. vi. 1882, by Friedk. Dahl in Schrift. Naturwiss. Schleswig-Holstein, Bd. vi. 1886, and in Sitz.-Bericht Gesell. nat. Freunde, Berlin, 1901, and by Embr. Strand in Archiv Mathem. Natur. B. xxiv. NR. 2, Kristiania, 1901.

I also take this opportunity to correct some slips in my former papers and errors occasioned by oversights, or new facts, in connexion with the various steps referred to in the process of ascertaining the types.

As regards Menge's genera: whenever he definitely cites a Tab. referring to a single species under the new generic name and before the diagnosis, I regard the species thus referred to as specially characteristic of the genus, and therefore as the type; though I have in most cases below traced out the history of the other species involved, for the sake of reference in case of future disputation.

In quoting the name *Walckenaera*, auct., it is here spelt as it was originally by Blackwall, *Walckenaeria*, and the former is regarded as a misquotation of the latter.

Ann. & Mag. Nat. Hist. ser. 7, vol. xi. (Jan. 1902), p. 9.

Line 1.—*Argus*, a nom. præocc. by Bohadsch, Anim. Marin. p. 65, Moll. Gastr. 1761.

Line 16.—*W. cristata* is a clerical error for *cuspidata*, Blackw.

Line 23.—Owing to the fact that *Arrecerus camelinus* was removed to *Phalops* by Menge in 1868 under *Theridium cornutum*, Wid., *A. monoceros* (Wid.) is left as the type of *Arrecerus*, Simon, and cannot be the type of *Prosopotheca*, as here stated.

See *loc. cit.* p. 10 ; lines 10–18 should read as follows :—

ARRECERUS, Simon, 1864.

Of the two species included originally, the first, *A. camelinus* (C. Koch), = *Ther. cornutum*, Wid., and *Walck. acuminatum*, Blackw., was withdrawn by Menge under *Phalops* in 1868, leaving *A. monoceros* (Wid.) as the type.

Type, *Arrecerus monoceros* (Wid.), 1834.

PROSOPOTHECA, Simon, Ar. Fr. v. p. 829 (1884).

Five species were originally referred to this genus:— (1) *Nerienne incisa*, O. P.-Cambr. ; (2) *Erigone corniculans*, O. P.-Cambr. ; (3) *Prosopotheca crocata*, Simon ; (4) *Theridium monoceros*, Wid. ; (5) *P. erythrina*, Simon.

The fourth, *T. monoceros*, selected by Simon (Hist. Nat. Ar. ii. p. 662, 1894) as the type, has been by elimination left in as the type of *Arrecerus*, Simon, and cannot therefore serve.

Since I cannot find that any other species has ever been selected, nor the genus otherwise broken up, I here select *Nerienne incisa*, O. P.-Cambr., as the type.

Type, *Prosopotheca incisa* (O. P.-Cambr.), 1871.—Europe.

### List of Genera referred to.

- |  |                                     |
|--|-------------------------------------|
| <i>Cyclosa</i> , Menge, p. 34.         | <i>Gongylidium</i> , Menge, p. 37.  |
| * <i>Cerceis</i> , Menge, p. 34.       | <i>Tmeticus</i> , Menge, p. 37.     |
| <i>Bathyphantes</i> , Menge, p. 34.    | <i>Dicymbium</i> , Menge, p. 38.    |
| * <i>Pedina</i> , Menge, p. 35.        | <i>Lophocarenum</i> , Menge, p. 38. |
| <i>Mengea</i> , nom. nov., p. 35.      | <i>Lophomma</i> , Menge, p. 39.     |
| <i>Helophora</i> , Menge, p. 35.       | * <i>Phalops</i> , Menge, p. 40.    |
| * <i>Stylophora</i> , Menge, p. 35.    | * <i>Dicyphus</i> , Menge, p. 40.   |
| <i>Lepthyphantes</i> , Menge, p. 36.   | * <i>Elaphidion</i> , Menge, p. 40. |
| <i>Stemonyphantes</i> , Menge, p. 36.  | <i>Elaphipus</i> , Menge, p. 41.    |
| <i>Drapetisca</i> , Menge, p. 36.      | <i>Cornicularia</i> , Menge, p. 41. |
| <i>Neottiura</i> , Menge, p. 36.       | <i>Microneta</i> , Menge, p. 41.    |
| <i>Crustulina</i> , Menge, p. 36.      | <i>Leptothrix</i> , Menge, p. 42.   |
| * <i>Ceratina</i> , Menge, p. 36.      | * <i>Drepanodus</i> , Menge, p. 42. |
| <i>Euryopsis</i> , Menge, p. 36.       | <i>Pronopius</i> , Menge, p. 42.    |
| * <i>Pachydactylus</i> , Menge, p. 37. | <i>Lethia</i> , Menge, p. 42.       |
| <i>Platyopsis</i> , Menge, p. 37.      | <i>Cicurina</i> , Menge, p. 43.     |
| <i>Gonatium</i> , Menge, p. 37.        | * <i>Ctenium</i> , Menge, p. 43.    |

*Scotina*, Menge, p. 43.  
*Drapeta*, Menge, p. 43.  
*Spiracme*, Menge, p. 43.  
*Psammitis*, Menge, p. 43.  
*Marpesia*, Menge, p. 44.  
*Œdipus*, Menge, p. 44.  
*Scartes*, Menge, p. 44.  
*Theridula*, Emerton, p. 44.  
*Ceratinella*, Emerton, p. 44.  
*Ceratinopsis*, Emerton, p. 45.  
*Grammonota*, Emerton, p. 45.  
*Spiropalpus*, Emerton, p. 45.  
*Diplostyla*, Emerton, p. 45.  
*Centromerus*, Dahl, p. 46.  
*Macrargus*, Dahl, p. 46.  
*Eustichothrix*, Dahl, p. 46.  
*Micrargus*, Dahl, p. 46.

*Microctenonyx*, Dahl, p. 47.  
*Paraectenonyx*, Dahl, p. 47.  
*Brachycentrum*, Dahl, p. 47.  
*Hypomma*, Dahl, p. 47.  
*Hypselomma*, Dahl, p. 48.  
*Mæbelia*, Dahl, p. 48.  
*Trematocephalus*, Dahl, p. 48.  
*Trachynotus*, Dahl, p. 48.  
*Phyllœca*, Dahl, p. 49.  
*Erigonella*, Dahl, p. 49.  
*Boleophthypantes*, Strand, p. 49.  
*Hemiphantes*, Strand, p. 49.  
*Oreonetides*, Strand, p. 49.  
*Utopiellum*, Strand, p. 50.  
*Centromeria*, Strand, p. 50.  
*Pseudogonatium*, Strand, p. 50.

[A \* before a generic name denotes that it is preoccupied.]

CYCLOSA, Menge, Preuss. Spinn. p. 73 (1866).

A single species only was originally referred to this genus—*Aranea conica*, De Geer.

Type, *Cyclosa conica* (De Geer), 1778.—Europe.

\*CERCEIS, Menge, Preuss. Spinn. p. 80 (1866).

A single species only was originally referred to this genus—*C. prominens* (Westr.).

Type, *Cerceis prominens* (Westring), 1851.—Europe.

The name *Cerceis* was, however, preoccupied by Milne-Edw. in 1840 for Crustacea; and Thorell in 1869 substituted for it the name *Cercidia*.

BATHYPHANTES, Menge, Preuss. Spinn. p. 111 (1866).

Eleven species were originally included in this genus:—

(1) *B. terricolus*, Menge, = *nigrinus*, Westr.; (2) *B. zebrinus*, Menge; (3) *B. pygmaeus* (Sund.) = Menge, non Sund.; (4) *B. crucifer*, Menge; (5) *B. longipes*, Menge, = *B. parvulus* (Westr.); (6) *B. comatus* (Wid.) = *B. bicolor*, Blackw.; (7) *B. angulipalpus* (Westr.); (8) *B. pallescens* (Menge, non Westr.) = *inermis* on Tab. = *Theridion rufum* (Wid.); (9) *B. cristatus*, Menge; (10) *B. brevipalpus*, Menge; (11) *B. setipalpus*, Menge, = *sylvaticus*, Blackw.

The genus was first broken up by Emerton, who, in Sept. 1882, withdrew *B. terricolus*, Menge, = *nigrinus*, Westr., under his new genus *Diplostyla*. This species therefore, although selected by Simon (Hist. Nat. Ar. ii. p. 705) as the



type of *Bathypantes*, cannot serve. *B. setipalpus*, Menge, = *sylvaticus*, Blackw., was removed to the genus *Centromerus* by Dahl in 1886; *B. comatus*, Wid., = *B. bicolor* (Blackw.) was removed to *Centromeria* by Strand in 1901; *B. pallescens*, Menge, = *Theridion rufum*, Wid., was removed to *Macrargus* by Dahl in 1886. Of the rest I cannot find that any have ever been referred to other genera or that a type has been cited. Menge did not himself cite any Tab. as specially characteristic of the genus, so that I here select *B. longipes*, Menge, = *Linyphia parvula* (Westr.) as the type.

Type, *Bathypantes longipes*, Menge, 1866, = *B. parvulus* (Westr.), 1851.—Germany.

\*PEDINA, Menge, Preuss. Spinn. p. 125 (1866).

A single species, *Pedina cristata* = *Linyphia scopigera*, Grube, 1859, was referred to this genus. The name *Pedina* is, however, preoccupied by Agassiz for *Ech.*, 1840.

Type, *Pedina scopigera* (Grube), 1859.—Europe.

MENGEA, nom. nov. for *Pedina*.

The name *Pedina* being preoccupied, I here propose the name *Mengea* to take its place.

Type, *Mengea scopigera* (Grube), 1859.—Europe.

HELOPHORA, Menge, Preuss. Spinn. p. 126 (1866).

A single species was originally referred to this genus, *Linyphia pallescens*, Westr., = *Linyphia insignis*, Blackw. (sec. Thor. & Sim.).

Type, *Helophora pallescens* (Westr.), 1851, = *H. insignis*, Blackw., 1841.—Europe.

\*STYLOPHORA, Menge, Preuss. Spinn. p. 128 (1866).

Two species were originally referred to this genus:—

(1) *Linyphia concolor*, Wid.; (2) *Stylophora albomaculata*, Menge.

These are closely allied, if not identical species, and, although neither was definitely cited by Menge, the first was selected by Simon as the type (Ar. Fr. v. p. 330, 1884).

The name *Stylophora*, however, is preoccupied by Desv. for Diptera (1830), and its place is taken by *Diplostyla*, Emert., whose type is also *concolor*, Wid. (see below).

Type, *Stylophora concolor* (Wid.), 1834.—Europe.

## LEPTHYPHANTES, Menge, Preuss. Spinn. p. 131 (1866).

Two species were originally referred to this genus:—  
(1) *Lepthyphantes muscicola*, Menge, p. 131; (2) *Aranea crypticola*, Walck.; the first being cited (Tab. 53) as characteristic of the genus. The second = (sec. Thor. & Sim.) *Nesticus cellulanus* (Olivier) was withdrawn as the type of *Nesticus* in 1869 by Thorell.

Type, *Lepthyphantes muscicola*, Menge, 1866, = *L. minutus* (Blackw.), 1833.—Europe.

## STEMONYPHANTES, Menge, Preuss. Spinn. p. 138 (1866).

A single species was originally referred to this name—*Aranea trilineata*, Linn. xii. p. 1031.

Type, *Stemonyphantes trilineatus* (Linnæus), 1767, = *lineatus*, Linn., 1758.

## DRAPETISCA, Menge, Preuss. Spinn. p. 140 (1866).

A single species only was originally referred to this genus—*Linyphia socialis*, Sundevall.

Type, *Drapetisca socialis* (Sundevall).

## NEOTTIURA, Menge, Preuss. Spinn. p. 162 (1868).

A single species was referred to this genus—*Aranea bimaculata*, Linn., = *Theridion bimaculatum*, auctores.

Type, *Neottiura bimaculata* (Linn.), 1767.—Europe.

## CRUSTULINA, Menge, Preuss. Spinn. p. 168 (1868).

A single species was originally referred to this genus—*Theridium guttatum*, Wider.

Type, *Crustulina guttata* (Wider), 1834.—Europe.

## \*CERATINA, Menge, Preuss. Spinn. p. 170 (1868).

Four species were originally included under this name:—  
(1) *Theridium breve*, Wider; (2) *Ceratina rubella*, Menge;  
(3) *C. rotunda*, Menge; (4) *C. globosa*, Menge.

The first species was definitely cited by Menge (Tab. 74) as characteristic of the genus.

*Ceratina* is, however, a nom. præocc. by Latreille for Hymenoptera (1804). (See Note, p. 50.)

Type, *Ceratina brevis* (Wid.), 1834.—Europe.

## EURYOPIS, Menge, Preuss. Spinn. p. 174 (1868).

Two species were originally included under this name:—

(1) *Micryphantes flavomaculatus*, Koch; (2) *Theridium tristis*, Hahn. The first was cited by Menge (Tab. 78) as characteristic of the genus and also by Thorell as the type in 1869.

Type, *Euryopsis flavomaculata* (C. L. Koch), 1836.—Europe.

\*PACHYDACTYLUS, Menge, Preuss. Spinn. p. 177 (1868).

A single species was originally referred to this genus—*Pachydactylus pronus*, Menge—regarded by Simon (Hist. Nat. Ar. ii. p. 567) as congeneric with *Dipæna*, Thorell. The name is preoccupied by Wiegmann in 1834 for Reptilia.

Type, *Pachydactylus pronus*, Menge, 1868.—Germany.

PLATYOPIS, Menge, Preuss. Spinn. p. 178 (1868).

A single species only was referred to this genus—*Theridium sulcifrons*, Wider—regarded by Simon (Ar. Fr. v. p. 792) as congeneric with *Panamomops*. The name *Platyopis* is not preoccupied so far as I can find out (sec. Simon, Hist. Nat. Ar. ii. p. 556), but *Platyope* is preoccupied.

Type, *Platyopis sulcifrons* (Wider), 1834.—Europe.

GONATIUM, Menge, Preuss. Spinn. p. 180 (1868).

Two species were originally included under this name:—*Theridion cheliferum*, Wider; (2) *Micryphantes isabellinus*, Koch. Both species were cited as characteristic (Tab. 82 & 83) by Menge.

The first, however, was selected as type in 1884 by Simon (Ar. Fr. v. p. 546).

Type, *Gonatium cheliferum* (Wider), 1834, = *G. rubens* (Blackw.), 1833.—Europe.

GONGYLIDIUM, Menge, Preuss. Spinn. p. 183 (1868).

A single species was originally referred to this genus—*Gongylidium nigricans*, Menge (= *G. crassipalpus*, Menge, pl. xxxiv. Tab. 84)—and is identical with *Linyphia rufipes*, Sund. (sec. Thor., Sim., and Kulcz.).

Type, *Gongylidium nigricans*, Menge, 1868, = *G. rufipes*, Sund., 1830.—Europe.

TMETICUS, Menge, Preuss. Spinn. p. 184 (1868).

Seven species were originally included in this genus:—(1) *T. leptocaulis*, Menge; (2) *T. foveolatus*, Menge; (3) *Theridium dentatum* (Wider); (4) *T. cristatus*, Menge;

- (5) *T. spinipalpus*, Menge; (6) *Linyphia graminicola*, Sund.;  
 (7) *T. hamipalpis*, Menge.

Of these species, (2) *T. foveolatus* (= *Erigone retusum*, Westr., sec. Thor., Sim.) was removed to *Kulczynskiellum* in Feb. 1895 by F. P.-Cambridge.

(3) *T. dentatum* was removed to *Trachygnatha* by Kulczynski in 1894.

(4) *T. cristatus* = (sec. Thorell) *T. dentatus*.

(7) *T. hamipalpis*, Menge, = sec. (Thor. & Sim.) *Erigone longimana*, C. L. K., = *Neriere vagans*, Blk., was removed to *Tiso* by Simon in 1884.

Of the four species left in, I cannot find that any have been referred to new genera, and Simon has in 1884 (Ar. Fr. v. pp. 378 & 420) cited the first, *T. leptocaulis* = (sec. Thor. & Sim.) *Erigone affinis*, Blackw., as the type, while Menge himself definitely referred (Tab. 85) to the first as characteristic of the genus.

Type, *Tmeticus leptocaulis*, Menge, 1868, = *T. affinis* (Blackw.), 1855.—Europe.

**DICYMBIUM**, Menge, Preuss. Spinn. p. 193 (1868).

Of the two species, *clavipes*, Menge (= *tibiale*, Blackw.), and *gracilipes*, Menge (= *nigrum*, Blackw.), Simon has selected the first as the type in Ar. Fr. v. p. 541, and the second as the type in Hist. Nat. Ar. ii. p. 658 (1894).

Menge, however, himself cited the first (Tab. 91) as specially characteristic of the genus, and this species = (sec. Thor. & Sim.) *Neriere tibialis*, Blackwall.

Type, *Dicymbium clavipes*, Menge, 1868, = *D. tibiale* (Blackw.), 1836.

**LOPHOCARENUM**, Menge, Preuss. Spinn. p. 198 (1868).

Eleven species were originally referred to this genus, but of these Menge definitely cited the first (Tab. 96) as characteristic of the genus, namely:—(1) *L. stramineum*, Menge; (2) *L. bihamatum*, Menge; (3) *Theridium acuminatum*, Wid.; (4) *L. parvulum*, Menge; (5) *Erigone erythropus*, Westr.; (6) *L. apiculatum*, Menge; (7) *E. scabricula*, Westr.; (8) *L. dicholophum*, Menge; (9) *L. globiceps*, Menge; (10) *L. crassipalpus*, Menge; (11) *Theridium elongatum*, Wider.

*L. bihamatum*, Menge, = (sec. Thor. & Sim.) *Walckenaeria latifrons*, O.P.-Cambr., was removed to *Plasiocrærus* by Simon in 1884. *L. acuminatum*, Menge, is not (sec. Thor. & Sim.) identical with *acuminatum*, Wid. *L. parvulum*, Menge, =



(sec. Thor. & Sim.) *W. hiemalis*, Blackw., was removed to *Troxochrus* by Simon in 1884. *L. erythropus*, Menge (non Westr., = *W. picina*, Blackw., sec. Thor. & Sim.), was removed to *Plasiocrærus* by Simon in 1884. *L. apiculatum*, Menge, = (sec. Thor. & Sim.) *Theridium pusillum*, Wid., was removed to *Minyriolus* by Simon in 1884. *E. scabricula* (Westr.) was removed to *Troxochrus* by Simon in 1884. *L. dicholophum*, Menge, = (sec. Thor. ? & Sim.) *T. elongatum*, Wid., was removed by Dahl to *Brachycentrum* in 1886. *L. globiceps*, Menge, = (sec. Thor. & Sim.) *W. humilis*, Blackw., was removed to *Areoncus* by Simon in 1884. *L. elongatum*, Menge, = (sec. Thor. & Sim.) *T. parallelum*, Wid., was removed to *Paractenonyx* by Dahl in 1886.

We have therefore (1) *L. stramineum*, Menge, (3) *L. acuminatum*, Menge, (10) *L. crassipalpus*, Menge, left as available for the type.

Simon selected *parallelum*, Wid., as the type of the genus in Hist. Nat. Ar. ii. p. 650 (1894). But, as already mentioned, this had been previously removed to a new genus by Dahl. The first species, too, in any case was cited by Menge (Tab. 96) as specially characteristic of the genus.

Type, *Lophocarenum stramineum*, Menge, 1868.—Europe.

LOPHOMMA, Menge, Preuss. Spinn. p. 209 (1868).

Nine species were originally referred to this genus:—

(1) *L. stictocephalum*, Menge; (2) *L. psilocephalum*, Menge; (3) *L. cristatum*, Menge; (4) *Theridium bicornis*, Wid.; (5) *T. anticum*, Wid.; (6) *L. flavidum*, Menge; (7) *Micryphantes cucullatus*, C. Koch; (8) *L. mitratum*, Menge; (9) *Erigone capito*, Westr.

Of these species, (1) *L. stictocephalum* = (sec. Thor. & Sim.) *Walckenaeria punctata*, Blackw., = (sec. Simon) *scrobiculata*, Menge, was removed under this latter name by Menge himself to his new genus *Microneta* (p. 227), but he had already cited *stictocephalum* (Tab. 108) as specially characteristic of the genus, so that he could not remove it himself.

(2) *L. psilocephalum* was removed to *Trachygnotus* by Dahl in 1886. (3) *L. cristatum*, = (sec. Thor. & Sim.) *monoceros*, Wid., was removed to *Prosopotheca* by Simon in 1884, and has also been left in as the type of *Arrecherus*, Sim. See above. (4) *L. bicornis* = (sec. Thor. & Sim.) *cristatus*, Blackw., was removed to *Prosoponcus* by Simon in 1884. (7) *L. cucullatum* (C. Koch) was removed to *Ithyomma* by Bertkau in 1884.

Of the rest, as mentioned above, the first was cited by

Menge and also by Simon as the type (Ar. Fr. v. p. 533, 1884).

Type, *Lophomma stictocephalum*, Menge, 1868, = *L. punctatum*, Blackw., 1841.—Europe.

\*PHALOPS, Menge, Preuss. Spinn. p. 218 (1868).

Four species were originally included under this name:— (1) *Theridium cornutum*, Wider; (2) *Erigone conica*, Westring; (3) *E. gibbicollis*, Westring; (4) *Phalops furcillatus*, Menge.

Of these species, the first was cited by Menge (Tab. 117) as characteristic of the genus. It is identical (sec. Thor. & Sim.) with *Walckenaeria acuminata*, Blackw. The second = (sec. Thor. & Sim.) *Savignia frontata*, Blackw., being the type of this genus. The third = (sec. Thor. & Sim.) *Erigone apicata*, Blackw. (1850), and was cited as the type of *Stylothorax* by Bertkau (1883). The fourth was removed to *Tigellinus* by Simon in 1884.

The first species is in any case the type, being cited by Menge. The name *Phalops*, however, is preoccupied by Erichson (*Phalops*, Deutschl. Insect. iii. p. 763, 1848).

Type, *Phalops cornutus* (Wid.), 1834, = *P. acuminatus* (Blackw.), 1833.—Europe.

\*DICYPHUS, Menge, Preuss. Spinn. p. 221 (1869).

Three species were originally referred to this genus:— (1) *D. tumidus*, Menge; (2) *D. cilunculus*, Menge; (3) *D. bicuspidatus*, Menge (Koch?).

Of these, Menge cited the first (Tab. 121) as characteristic of the genus and (sec. Thor. & Sim.) = *Theridium bituberculatum*, Wider. The second = (sec. Thor. & Sim.) *Nerine cornuta*, Blackw., and the third = (sec. Simon) *Micryphantes elevatus*, Koch. Both these last species were removed to *Dismodicus* by Simon in 1884. The name *Dicyphus* is preoccupied by Fiebuhr for Hemiptera.

Type, *Dicyphus tumidus*, Menge, 1869, = *D. bituberculatus* (Wid.), 1834.—Europe.

\*ELAPHIDION, Menge, Preuss. Spinn. p. 224 (1869).

A single species was originally referred to this genus—*E. flagelliferum*, Menge.

The name *Elaphidion* has been changed to *Elaphipus* by Menge in his Index (p. 8), and quoted as *Elaphopus* by Simon (Hist. Nat. Ar. ii. p. 697). It was preoccupied by Serv. in

1834 for Coleoptera. The name *Elaphipus* (not *Elaphopus*, as in Scudder) takes its place.

Type, *Elaphidion flagelliferum*, Menge, 1869.—Europe.

ELAPHIPUS, Menge, Preuss. Spinn., Index, p. 10 (1878).

Nom. nov. for *Elaphidion*.

Type, *Elaphipus flagellifer*, Menge.

CORNICULARIA, Menge, Preuss. Spinn. p. 226 (1869).

A single species only was originally referred to this genus:—*Theridion monoceros*, Wid. This, however, is obviously *not* the species diagnosed and figured by Menge. He has wrongly identified *monoceros*, Wider, and his genus is based on his diagnosis and figures, which, so far as we can at present tell, = *Walckenaeria unicornis*, O. P.-Cambr. (sec. Thor. & Sim.).

Type, *Cornicularia unicornis* (O. P.-Cambr.), 1861.—Europe.

MICRONETA, Menge, Preuss. Spinn. p. 227 (1869).

Nine species were originally included in this genus:—(1) *M. scrobiculata*, Menge; (2) *Micryphantes ochropus*, Koch; (3) *Erigone quisquiliarum*, Westr.; (4) *Micryphantes tessellata*, Koch; (5) *M. pusilla*, Menge; (6) *Erigone Sundevallii*, Westr.; (7) *M. gracilis*, Menge; (8) *M. pygmaea*, Menge; (9) *M. bifida*, Menge, = *M. biloba* on the plate.

Of these, Menge has not specially cited any species before the generic diagnosis.

(1) *M. scrobiculata*, Menge, was cited on p. 209 of this same work as the type of *Lophomma* if it = (as sec. Thor. & Sim.) *L. stictocephalum*, Menge.

(2) *M. ochropus*, Koch, = (sec. Thor. & Sim.) *Theridium pusillum*, Wid., but has been wrongly identified by Menge. *M. ochropus*, Menge, = (sec. Thor. & Sim.) *Nerienne innotabilis*, O. P.-Cambr.

(3) *E. quisquiliarum*, Westr., = (sec. Thor. & Sim.) *Nerienne viaria*, Blackw.

(4) *M. tessellata*, C. Koch (sec. Thor., impossible to decide its identity); but *M. tessellata*, Menge, = (sec. Thor. & Sim.) *Nerienne fusca*, Blackw., and has been removed in 1895 to *Kulczynskielum*, F. P.-Cambr.

(6) *E. Sundevallii*, Westr., was removed to *Maso* by Simon in 1884 and to *Phyllæca* by Dahl in 1886.

(7) *M. gracilis*, Menge, is (sec. Simon) "probably a *Syedra*," but was not definitely removed to that genus in 1884.

Of the rest, it is doubtful what species are represented by (5) *M. pusilla*, Menge, (8) *M. pygmaea*, Menge, (9) *M. bifida*, Menge, although Kulczynski, in his Index Ar. Hungariæ, refers to ii. page 113 as reference for *M. pusilla*, Menge. But there is no mention of the species on that page, at any rate in connexion with Menge.

We have left in, therefore, numbers (2), (3), (5), (7), (8), and (9), and, as far as I can make out, Simon was the first to select a type for the genus (Hist. Nat. Ar. ii. p. 703, 1894). He cited *M. viaria*, Blackw., which = *M. quisquiliarum* (Westr.), as the type.

Type, *Microneta quisquiliarum* (Westr.), 1851, = *M. viaria*, Blackwall, 1841.—Europe.

LEPTOTHRIX, Menge, Preuss. Spinn. p. 240 (1869).

A single species was originally referred to this genus—*L. clavipes*, Menge, = (sec. Thor. & Sim.) *Walckenaeria Hardii*, Blackw., 1850.

Type, *Leptothrix clavipes*, Menge, 1869, = *Hardii* (Blackw.), 1850.—Germany.

\*DREPANODUS, Menge, Preuss. Spinn. p. 241 (1869).

A single species was originally referred to this genus—*D. obscurus*, Menge, = (sec. Simon) *Theridium thoracicum*, Hahn.

The name *Drepanodus* is preoccupied by Pand. in 1856 for Pisces.

Type, *Drepanodus obscurus*, Menge, 1868, = *thoracicus* (Hahn), 1831.—Germany.

PRONOPHIUS, Menge, Preuss. Spinn. p. 243 (1869).

A single species was originally referred to this genus—*P. providus*, Menge.

Type, *Pronopius providus*, Menge, 1869.—Germany.

LETHIA, Menge, Preuss. Spinn. p. 249 (1869).

Two species were originally included under this name:—

(1) *Lethia varia*, Menge; (2) *Lethia stigmatisata*, Menge.

The first, which = (sec. Thor. & Sim.) *Ciniflo humilis*, Blackw., was cited by Menge (Tab. 145) as characteristic of the genus.

Type, *Lethia varia*, Menge, 1869, = *L. humilis* (Blackw.), 1855.



CICURINA, Menge, Preuss. Spinn. p. 271 (1871).

A single species was originally referred to this genus—*Cicurina cicur*, Menge. Regarded by Menge as = *Tegenaria cicurea*, Koch, = (sec. Thor. & Sim.) *Aranea cinerea*, Panz.

Type, *Cicurina cicur*, Menge, 1871, = *C. cinerea* (Panzer), 1793.—Europe.

\*CTENIUM, Menge, Preuss. Spinn. p. 292 (1871).

A single species was originally referred to this genus—*Erigone pinguis*, Westring, = (sec. Thor. & Sim.) *Neriene livida*, Blackw.

*Ctenium* is, however, a nom. præocc. by Panzer, Lepid., 1825.

Type, *Ctenium pingue* (Westring), 1851, = *C. lividum*, Blackw., 1836.

SCOTINA, Menge, Preuss. Spinn. p. 337 (1873).

A single species was originally referred to this genus—*Agelena gracilipes*, Blackwall.

Type, *Scotina gracilipes* (Blackwall), 1864.—England.

DRAPETA, Menge, Preuss. Spinn. p. 387 (1874).

A single species was originally referred to this genus—*D. æneus*, Menge—which probably belongs to the genus *Philodromus* as at present understood. The generic name is, however, omitted by Simon in Hist. Nat. Ar. ii. p. 1063 &c.

Type, *Drapeta æneus*, Menge, 1874.—Germany.

SPIRACME, Menge, Preuss. Spinn. p. 446 (1875).

A single species was originally referred to this genus—*S. striata*, Menge—and probably belongs to the genus *Xysticus*, Koch.

Type, *Spiracme striata*, Menge, 1875.—Germany.

PSAMMITIS, Menge, Preuss. Spinn. p. 448 (1875).

Two species were originally included under this name:—

(1) *Thomisus sabulosus*, Hahn; (2) *Psammitis abscondita*, Menge.

Both were cited by Menge (Tab. 254 & 255) as characteristic of the genus, and I therefore here select the first as the type.

Type, *Psammitis sabulosus* (Hahn), 1831.—Europe.

MARPESIA, Menge, Preuss. Spinn. p. 471 (1876).

A single species was originally referred to this genus—*M. arenicola*, Menge—and belongs to the fam. Salticidæ.

Type, *Marpesia arenicola*, Menge, 1876.—Germany.

ÆDIPUS, Menge, Preuss. Spinn. p. 482 (1876).

A single species was originally referred to this genus—*Ballus ænescens*, Simon, Mon. Att. p. 628—and belongs to the family Salticidæ.

Type, *Ædipus ænescens* (Simon).

SCARTES, Menge, Preuss. Spinn. p. 494 (1877).

A single species was originally referred to this genus—*S. parvulus*, Menge—which belongs to the family Salticidæ.

Type, *Scartes parvulus*, Menge, 1877.—Germany.

J. H. EMERTON. "New Zealand Therididæ," Trans. Conn. Acad. vol. vi. (Sept. 1882).

THERIDULA, Emerton, Trans. Conn. Acad. vi. p. 25 (1882).

A single species was originally referred to this genus—*Theridion sphærula*, Hentz.

Type, *Theridula sphærula* (Hentz), 1850.—N. America.

CERATINELLA, Emerton, Trans. Conn. Acad. vi. p. 32 (1882).

Ten species were originally included in this genus:—(1) *Erigone Emertoni*, O. P.-Cambr.; (2) *E. fissiceps*, O. P.-Cambr.; (3) *C. bulbosa*, Emerton; (4) *C. pygmæa*, Emerton; (5) *E. atriceps*, O. P.-Cambr.; (6) *E. læta*, O. P.-Cambr.; (7) *E. lætabilis*, O. P.-Cambr.; (8) *C. brunnea*, Emerton; (9) *C. minuta*; (10) *C. micropalpis*, Emerton.

These alone must be taken into consideration in settling the type of *Ceratinella*; for this is not a case of the definite substitution of one name for another, as Simon suggests (Ar. Fr. v. p. 595), but a new genus is founded with definite species quoted under it; and *Ceraticelus*, proposed by Simon to include the species placed by Emerton under *Ceratinella*, which were not congeneric with Menge's *Ceratina*, will become a synonym of the former. It is of the utmost importance, in view of avoiding future complications, to keep these points clear and distinct. So far as I can make out, no type had definitely been selected for *Ceratinella* until Simon selected *Theridium breve*, Wid. (Hist. Nat. Ar. ii. p. 649, 1894).

Type, *Ceratinella brevis* (Wid.), 1834.—Europe.

CERATINOPSIS, Emerton, Trans. Conn. Acad. vol. vi. p. 36 (1882).

Four species were originally referred to this genus:—(1) *Erigone interpres*, O. P.-Cambr.; (2) *Ceratinopsis nigricaps*, Emert.; (3) *C. laticeps*, Emert.; (4) *C. nigripalpis*, Emert.

I cannot find that any of these species have ever been removed to a new genus, but the type was definitely selected by Simon (Hist. Nat. Ar. ii. p. 673, 1894), *C. interpres*, O. P.-Cambr.).

Type, *Ceratinopsis interpres* (O. P.-Cambr.), 1874.—N. America.

GRAMMONOTA, Emerton, Trans. Conn. Acad. vol. vi. p. 38 (1882).

Three species were originally referred to this genus:—(1) *Erigone pictilis*, O. P.-Cambr.; (2) *Erigone ornata*, O. P.-Cambr.; (3) *G. inornata*, Emert.

I cannot find that any of these have ever been removed to a new genus, but the type was definitely selected by Simon (Hist. Nat. Ar. ii. p. 666, 1894), *Erigone pictilis*, O. P.-Cambr.

Type, *Grammonota pictilis* (O. P.-Cambr.), 1875.—N. America.

SPIROPALPUS, Emerton, Trans. Conn. Acad. vol. vi. p. 39 (1882).

A single species was originally referred to this genus—*Spiropalpus spiralis*, Emerton.

Type, *Spiropalpus spiralis*, Emerton, 1882.—N. America.

DIPLOSTYLA, Emerton, Trans. Conn. Acad. vol. vi. p. 65 (1882).

Three species were originally included which must be taken into consideration in the settlement:—(1) *Linyphia concolor*, Wid.; (2) *Bathyphantes nigrinus* (Westr.); (3) *Diplostyla canadensis*, Emert.

None of these have, so far as I can ascertain, been removed to new genera, nor has the type of *Diplostyla* been selected, and I here select *L. concolor*, Wid., as the type. *Diplostylus*, not *Diplostyla*, is preoccupied by Salter for Crustacea, 1863.

Type, *Diplostyla concolor* (Wid.), 1834.—Europe.

DR. FRIEDK. DAHL. "Monographie Erigonen-Arten &c.," in Schriften des naturwissenschaftlichen Vereins für Schleswig-Holstein. 1886.

CENTROMERUS, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi. p. 73 (1886).

Five species were originally included in this genus:—  
(1) *Micryphantes aqualis*, C. K.; (2) *Nerienne sylvatica*, Bl.;  
(3) *Erigone pabulatrix*, Cambr.; (4) *Tmeticus ilibatus*, Sim.;  
(4) *N. montana*, Blackw., = *timidus*, Sim. (Ar. Fr. v. p. 407).

So far as I can make out, none of these have been removed to new genera, nor can I find that the type has ever been definitely selected. I therefore here select *Nerienne sylvatica*, Blackw., as the type.

Type, *Centromerus sylvaticus* (Blackw.), 1841.—England.

MACRARGUS, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi. p. 76 (1886).

One species only is here referred to this genus—*Theridium rufum*, Wid.

Type, *Macrargus rufus* (Wider), 1834.—Europe.

EUSTICHOTHRIX, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi. p. 78 (1886).

Two species were originally referred to this genus:—  
(1) *Theridion sanguinolentum*, Walck.; (2) *Walckenaeria obscura*, Blackw.

The first was already preoccupied as the type, being the only species referred to it of *Nematogmus*, Simon, 1884. The second is therefore left in as the type.

Type, *Eustichothrix obscurus* (Blackw.), 1834.—England.

MICRARGUS, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi. p. 79 (1886).

Three species were originally referred to this genus:—  
(1) *Nerienne herbigrada*, Cambr., misprint for Blackw.;  
(2) *Walckenaeria diceros*, Cambr.; (3) *Nerienne latebricola*, Cambr.

I cannot find that any of these have been since referred to new genera, although Simon has cited the last—*latebricola*, Cambr.—as the type of his *Gongylidiellum* (Hist. Nat. Ar. ii. p. 669, 1894). But this cannot, of course, stand, since Dahl had then broken up the genus and removed the species to *Micrargus*.

I here select *M. herbigradus* (Blackw.) as the type.

Type, *Micrargus herbigradus* (Blackw.), 1854.—England.



MICROCTENONYX, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi.  
p. 80 (1886).

Three species were originally included in this genus:—  
(1) *Erigone subitanea*, Cambr.; (2) *Micryphantes ovatus*,  
C. Koch; (3) *Erigone longimana*, C. Koch.

So far as I can discover, none of these have since been removed to new genera. I therefore select the first—*Erigone subitanea*, O. P.-Cambr.—as the type, for the genus will probably go as a synonym whichever may be selected. Simon has selected (Hist. Nat. Ar. ii. p. 653, 1894) *longimanus* = *vagans* as type of *Tiso*; but this cannot stand, having been already removed to a new genus by Dahl.

Type, *Microctenonyx subitaneus* (O. P.-Cambr.), 1875.—England.

PARACTENONYX, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi.  
p. 85 (1886).

A single species was originally referred to this genus—*Theridium parallelum*, Wid.

Type, *Paractenonyx parallelus* (Wid.), 1834.

BRACHYCENTRUM, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi.  
p. 86 (1886).

Two species were originally referred to this genus:—  
(1) *Theridium elongatum*, Wid.; (2) *B. Mæbi*, Dahl.

Neither of these having been removed to a new genus, I select the first as the type.

Type, *Brachycentrum elongatum* (Wid.), 1834.

HYPOMMA, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi.  
p. 87 (1886).

Two species were originally referred to this genus:—  
(1) *Walckenaeria bifrons*, Blackw.; (2) *Theridium bituberculatum*, Wid.

The second species had already (1834) been definitely cited as the type of *Dicyphus*, Menge, by Simon (Ar. Fr. p. 546). And since this is not a case of simple substitution of a new generic name for one preoccupied—a new species, not originally included, having been added—*T. bituberculatum* is not necessarily the type also of *Hypomma*, and furthermore ought not to serve. The first remains as the type, and cannot in any case be the type of *Dismodicus*, as cited by Simon (Hist. Nat. Ar. ii. p. 665, 1894), having already been removed to a new genus by Dahl.

Type, *Hypomma bifrons* (Blackw.), 1841.—England.

HYPSELOMMA, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi. p. 91 (1886).

A single species was originally referred to this genus—*Walckenaeria altifrons*, O. P.-Cambr., = *Theridium acuminatum*, Wid. (sec. Thor. & Sim.), and cannot serve as the type of *Entelecara*, as cited by Simon (Hist. Nat. Ar. ii. p. 658, 1894), having already been removed to a new genus by Dahl.

Type, *Hypselomma acuminata* (Wid.), 1834, = *W. altifrons*, O. P.-Cambr., 1863.

MÆBELIA, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi. p. 91 (1886).

Two species were originally referred to this genus:—(1) *Erigone penicillata*, Westr.; (2) *Walckenaeria picina* (Blk.).

Neither of these has, so far as I can make out, been since removed to a new genus, nor has the type been cited. I therefore select the first—*E. penicillata*, Westr.—as the type.

Type, *Mæbelia penicillata* (Westr.), 1851.—Sweden.

TREMATOCEPHALUS, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi. p. 91 (1886).

A single species was originally referred to this genus—*Erigone perforata*, Thor., = *Theridion cristatum*, Wid.—the last name having priority.

Type, *Trematocephalus perforatus* (Thor.), 1871, = *T. cristatus* (Wid.), 1834.

TRACHYNOTUS, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi. p. 95 (1886).

Four species were originally included in this genus:—(1) *Walckenaeria obtusus* (Blk.); (2) *Lophomma psilocephalum*, Menge; (3) *Walckenaeria unicornis*, O. P.-Cambr.; (4) *Walckenaeria cuspidata*, Blk.

Of these, no. 3 is the type (if, as sec. Thor. & Sim., it = *monoceros*, Menge) of *Cornicularia*, Menge. No. 4 was left in by elimination as the type of *Walckenaeria*, Blackw.

The first two species are therefore available as the type, for I cannot find that either of them has been referred to any new genus. I therefore select the first—*W. obtusa*, Blackw.—as the type.

Type, *Trachynotus obtusus* (Blackw.), 1836.—England.

PHYLLÆCA, Dahl, Schrift. natur. Schl.-Holstein, Bd. vi. p. 101 (1886).

Two species were included in this genus:—(1) *Erigone Sundevalli*, Westr.; (2) *Theridium marginellum*, Wid., = *P. marginata*, Dahl.

The second is already preoccupied as the type of *Minicia*, Thorell (Tijds. v. Ent. xviii. 1875, p. 93, note), under the name *spinosa*. *E. Sundevalli* is thus left in as the type.

Type, *Phyllæca Sundevalli* (Westr.), 1861.—Sweden.

ERIGONELLA, Dahl, Sitz.-Bericht Gesell. nat. Freunde, Berlin, p. 261 (Dec. 1901).

Two species were originally included in this genus:—*Walckenaeria hiemalis*, Blackw., and *Walckenaeria latifrons*, O. P.-Cambr. Dahl quotes them as “Typ. *hiemalis* (Bl.) + *latifrons* (Cambr.).” Since there cannot be two type species for a genus, I here select the first.

Type, *Erigonella hiemalis* (Blackw.), 1841.—England.

EMBR. STRAND. “Theridiiden aus dem nördlichen Norwegen,” Archiv for Mathematik og Naturvidenskab, B. xxiv. NR. 2. Kristiania, 1901.

BOLEPTHYPHANTES, Strand, Archiv Mathem. Natur. B. xxiv. NR. 2, p. 9 (1901).

A single species—*Linyphia index*, Thor.—was included in this genus, which is cited as the type on pp. 9 and 53.

Type, *B. index* (Thor.), 1856.—Europe.

HEMIPHANTES, Strand, Archiv Mathem. Natur. B. xxiv. NR. 2, p. 23 (1901).

A single species—*H. arcticus*, Strand—was included in this genus, and was cited as the type on p. 23.

Type, *Hemiphantes arcticus*, Strand, 1901.—Norway.

OREONETIDES, Strand, Archiv Mathem. Natur. B. xxiv. NR. 2, p. 29 (1901).

A single species is cited on p. 30 as the type of this genus—*O. vaginatus* (Thor.), 1872, = *O. adipatus* (L. Koch), 1872.

Type, *Oreonetides adipatus* (L. Koch), 1872.

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UTOPIELLUM, Strand, Archiv Mathem. Natur. B. xxiv. NR. 2 (1901).

A single species—*Erigone mirabilis*, L. Koch, 1879, is cited on p. 31 as the type of this genus.

Type, *Utopiellum mirabile* (L. Koch), 1879.

CENTROMERIA, Strand, Archiv Mathem. Natur. B. xxiv. NR. 2, p. 33 (1901).

A single species—*Nerienne bicolor*, Blackw.—was referred to this genus.

Type, *Centromeria bicolor* (Blackw.), 1833.—England.

PSEUDOGONATIUM, Strand, Archiv Mathem. Natur. B. xxiv. NR. 2, p. 37 (1901).

A single species was referred to this genus.

Type, *Pseudogonatum fuscomarginatum*, Strand, 1901.—Norway.

#### NOTE.

In the cases dealt with above there occur several instances of definite and doubtful substitution of new names for those preoccupied, the settlement of their types being in some cases further complicated by the addition of new species not originally included in the genus for which the new name is definitely or doubtfully substituted.

It will, perhaps, be useful to explain the methods followed in such cases:—

- A. A case of a definite and distinctly stated substitution (e. g., *Cercidia*, Thor., for *Cerceis*, Menge), or where there is no doubt, since the original name is quoted as a synonym under the new one. Then in cases where
  - (a) no species at all are quoted under the new name—then the species which was the type of the original genus is regarded also as the type under the new name substituted;
  - (b) when one or more of the original species are quoted, then the type is to be looked for amongst these only (e. g., *Cercidia*, Thorell);
  - (c) when new species are quoted, as well as one or more old ones, then these, too, are taken into consideration—



- for the genus is not then conterminous with the original one, but the case passes from being one of simple substitution and becomes a case of a new genus (e. g., *Diplostyla*, Emert., in relation to *Stylophora*, Menge);
- (d) when new species alone are quoted, and no old ones, then the case is one of a new genus, pure and simple (e. g., *Ceratinella*, Emert., for *Ceratina*, Menge).
- B. In a case where there is no definite substitution of a new name for an old one, or an implied substitution by virtue of a quotation of the old name as a synonym under the new one. Then
- (a) if the type species of the old genus turns out to be the type of the new one, then the new name is treated as virtually a substitution; but
- (b) if not, then it is still open to anyone to substitute a new name for the old preoccupied one, with the original type species to represent it (e. g., *Hypomma*, Dahl, in relation to *Dicyphus*, Menge).

*The case of Erroneous Identification of Species  
quoted as Types.*

When the species quoted as the type of a genus has been wrongly identified, then the type of the genus will be the species which has been diagnosed, and not that quoted by name, e. g.:—

Example 1. See above, *Cornicularia*, Menge.

Example 2. *Phryxotrichus*, Sim., substituted for *Orthotrichus*, Karsch, nom. præocc., followed by diagnosis of a species identified by Simon as *vulpinus*, the type of *Orthotrichus*.

If the species be rightly identified, *vulpinus*, Karsch, is the type of *Phryxotrichus*. If, however, it be wrongly identified, then the species diagnosed under the substituted name must be the type.

Example 3. *Cyrtopholis*, Sim., substituted for *Cyrtosternum*, Auss., nom. præocc., followed by diagnosis of *Crypsidromus innocuus*, Auss. (identified by Simon); while Simon quotes *C. cursor*, Auss., as the type. The type, however, of *Cyrtopholis* cannot be *C. cursor*, but must be the species diagnosed.

III.—*Descriptions of Four new Species of Barbus discovered by Mr. A. Blayney Percival in East Africa.* By G. A. BOULENGER, F.R.S.

[Plate V.]

*Barbus Percivali.* (Pl. V. fig. 1.)

Depth of body equal to length of head,  $3\frac{1}{2}$  to  $3\frac{3}{4}$  times in total length. Snout rounded, as long as the eye, which is contained  $3\frac{1}{2}$  to 4 times in length of head; interorbital width  $2\frac{1}{2}$  to  $2\frac{3}{4}$  times in length of head; mouth small, subinferior; lips moderately developed, lower interrupted on the chin; barbels two on each side, anterior as long as eye or a little longer, posterior  $1\frac{1}{3}$  to  $1\frac{1}{2}$  diameters of eye. Dorsal III 6-7, nearer occiput than base of caudal, with scarcely emarginate border; last simple ray bony, strongly serrated, about  $\frac{3}{4}$  length of head. Anal III 5, longest ray  $\frac{3}{5}$  length of head. Pectoral  $\frac{3}{4}$  length of head, not reaching ventral; latter below anterior rays of dorsal. Caudal peduncle  $1\frac{3}{4}$  to  $1\frac{3}{4}$  as long as deep. Scales 28-30  $\frac{4\frac{1}{2}-5\frac{1}{2}}{5\frac{1}{2}}$ , 3 or  $3\frac{1}{2}$  between lateral line and base of ventral, 12 round caudal peduncle. Silvery, brownish on the back; two or three black spots on each side, the first or first two above the lateral line, the last at the base of the tail; a small black spot on each side of the base of the dorsal at its origin; a more or less distinct dark streak along lower surface of caudal peduncle.

Total length 55 millim.

Several specimens from the Nairobi River, Kilimanjaro, 6500 feet.

*Barbus lumiensis.* (Pl. V. fig. 2.)

Depth of body  $3\frac{1}{2}$  times in total length, length of head 4 times. Snout rounded, as long as the eye, which is contained 4 times in length of head; interorbital width  $2\frac{1}{3}$  times in length of head; mouth small, terminal; lips moderately developed, lower interrupted on the chin; barbels two on each side, anterior slightly longer than eye, posterior nearly twice as long as eye. Dorsal III 7, nearer occiput than base of caudal, with slightly emarginate border; last simple ray bony, strongly serrated, nearly as long as head. Anal III 5, longest ray  $\frac{3}{4}$  length of head. Pectoral  $\frac{4}{5}$  length of head, not reaching ventral; latter entirely in advance of dorsal. Caudal peduncle  $1\frac{3}{4}$  as long as deep. Scales 27  $\frac{4\frac{1}{2}}{4\frac{1}{2}}$ , 3



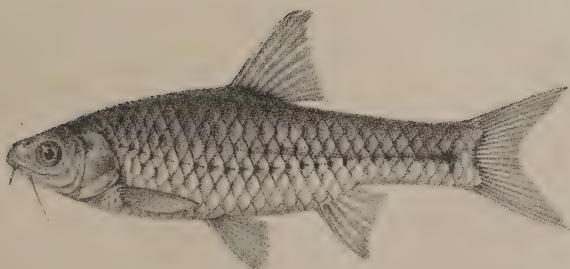
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Mintern Bros. imp.

J. Green. del. et lith.

1. BARBUS PERCIVALI  
3. B. LINEOMACULATUS

2. B. LUMIENSIS.  
4. B. AMPHIGRAMMA.

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between lateral line and ventral, 12 round caudal peduncle. Silvery, brownish on the back, scales edged with dark brown; fins whitish.

Total length 70 millim.

A single specimen from the River Lumi, on the east side of Kilimanjaro, running into Lake Jipi.

*Barbus lineomaculatus*. (Pl. V. fig. 3.)

Depth of body  $3\frac{2}{3}$  times in total length, length of head 4 times. Snout rounded, as long as the eye, which is contained  $3\frac{2}{3}$  times in length of head; interorbital width  $2\frac{1}{2}$  to  $2\frac{2}{3}$  times in length of head; mouth small, subinferior; lips moderately developed, lower interrupted on the chin; barbels two on each side, anterior  $1\frac{1}{3}$  to  $1\frac{1}{2}$  diameters of eye, posterior  $1\frac{1}{2}$  to  $1\frac{2}{3}$ . Dorsal III 8, nearer occiput than base of caudal, with feebly emarginate border; last simple ray not enlarged, flexible, not serrated, as long as head. Anal IV 5, longest ray  $\frac{3}{4}$  length of head. Pectoral  $\frac{3}{4}$  length of head, not reaching ventral; latter below anterior rays of dorsal. Caudal peduncle twice as long as deep. Scales  $30\frac{4\frac{1}{2}}{4\frac{1}{2}}$ , 3 between lateral line and base of ventral, 12 round caudal peduncle. Silvery, brownish on the back, some of the scales dark brown at the base; a series of 4 to 7 black spots on each side, connected by a dark lateral streak; all but the last spot above the lateral line.

Total length 67 millim.

Two specimens from the Lumi River.

*Barbus amphigramma*. (Pl. V. fig. 4.)

Depth of body equal to length of head,  $3\frac{3}{4}$  or  $3\frac{1}{2}$  times in total length. Snout rounded, as long as the eye, which is contained 4 times in length of head; interorbital width  $2\frac{1}{3}$  times in length of head; mouth small, subinferior; lips moderately developed, lower interrupted on the chin; barbels two on each side, anterior about  $\frac{1}{3}$ , posterior  $\frac{2}{3}$  diameter of eye. Dorsal III 7, a little nearer occiput than base of caudal, the border not emarginate; last simple ray not enlarged, flexible, a little shorter than head. Anal III 5, longest ray  $\frac{3}{5}$  to  $\frac{2}{3}$  length of head. Pectoral nearly  $\frac{3}{4}$  length of head, not reaching ventral; latter slightly in advance of origin of dorsal. Caudal peduncle twice as long as deep. Scales  $35-36\frac{6\frac{1}{2}}{6\frac{1}{2}}$ , 4 between lateral line and base of ventral, 16 round caudal peduncle. Yellowish, pale olive on the back; a blackish lateral streak, independently of the lateral line, which is also

blackish, the two meeting on the caudal peduncle; a small black spot at the base of the caudal and another at the base of the anal.

Total length 40 millim.

Three specimens from the Nairobi River, Kilimanjaro, 6500 feet.

In addition to these new *Barbus*, Mr. Percival obtained examples of the following species:—*Labeo montanus*, Gthr. (Lumi River); *Discognathus dembeensis*, Rüpp. (Nairobi River); and *Tilapia Hunteri*, Gthr. (Lake Chala, east of Kilimanjaro).

#### EXPLANATION OF PLATE V.

Fig. 1. *Barbus Percivali*.

Fig. 2. — *lumiensis*.

Fig. 3. — *lineomaculatus*.

Fig. 4. — *amphigramma*.

[All natural size.]

#### IV. — *Descriptions of Two new Lizards discovered by Mr. E. Degen in his Journey to Abyssinia.* By G. A. BOULENGER, F.R.S.

##### *Hemidactylus ophiolepis.*

Snout a little longer than the distance between the eye and the ear-opening, once and a half the diameter of the orbit; no frontal concavity; ear-opening small, oval, vertical. Body and limbs moderate. Digits moderately dilated, free, with rather short distal joints; 5 lamellæ under the thumb, 8 under the fourth finger, 4 under the hallux, 9 under the fourth toe. Head covered with flat juxtaposed scales, largest on the snout; rostral quadrangular, twice as broad as high, with median cleft above; nostril pierced between the rostral, the first labial, and three nasals, the upper of which is large and forms a suture with its fellow; seven upper and six lower labials; symphyseal large, triangular, more than twice as long as the adjacent labials; median pair of chin-shields largest and forming a suture behind the symphyseal. Body covered with uniform, imbricate, roundish, smooth scales, largest on the back; 50 scales round the middle of the body. Male with 8 præanal pores, forming an angular series. Tail cylindrical, tapering, covered with imbricate smooth scales, which are larger than those on the body; those of the mid-



V.—Notes on the Genus *Synaptura*, Cantor, with Descriptions of Two new Species. By C. TATE REGAN, B.A.

[Plate VI.]

IN a recent list of the fishes of Japan, Messrs. Jordan and Snyder \* have separated from the genus *Synaptura*, Cantor, as a distinct genus, *Zebrias*, the section characterized by the rudimentary left pectoral, of which they recognize three Japanese species, viz., *Z. quagga*, Kaup, *Z. zebrinus*, Schlegel, and *Z. japonicus*, Bleeker.

According to Day †, examination of the actual type specimen of *Synaptura zebra*, Bloch, shows *Synaptura quagga*, Kaup, to be a synonym of it. If we turn to Bloch's description and figure, there can be little doubt as to the correct judgment of Day; the description of the cross-bands on the body as paired, but confluent posteriorly, is particularly applicable to this species, whilst the total number of cross-bands and their disposition on the head and anterior part of the body are very accurately depicted; whether the irregularity of the posterior bands is due to the imagination of the artist or to an abnormality of the specimen from which the drawing was made is a point not yet cleared up.

*Synaptura zebrina*, Schlegel, is undoubtedly a synonym of *Synaptura ommatura*, Richardson; and an examination of all the specimens in the British Museum collection has convinced me that *S. japonica*, Bleeker, is based on a young specimen of the same species, from which it is said to differ in having a longer nasal tube, the eyes somewhat closer together, and the dorsal and anal fins united only to the basal half of the caudal instead of being entirely confluent with it. The twenty-four cross-bands on the head and body are described as having a light centre and dark edges, instead of being uniformly brown, and the caudal is said to be without yellow spots.

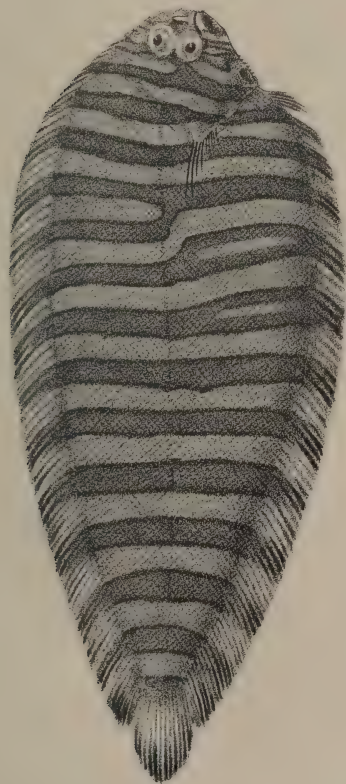
A specimen of *Synaptura ommatura*, 75 millim. long, agrees perfectly with Bleeker's description of *S. japonica*, and a series of specimens shows that during growth the nasal tube becomes relatively somewhat shorter and the eyes further apart, the caudal relatively shorter and approximating to the length of the posterior rays of the dorsal and anal, and the dark edges of the cross-bands less and less well defined.

I find that in the closely allied species *S. zebra*, Bloch, and

\* Annot. Zool. Japon. iii. 1901, pt. 2, p. 123.

† 'Fishes of India,' p. 430.





2.



1a.



1.



2a.

1. SYNAPTURA SMITHII.

2. SYNAPTURA CALLIZONA.

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*Æsopia cornuta*, Cuvier, young examples have the caudal fin relatively longer and in its outer part free from the dorsal and anal, exactly as in the case of *S. ommatura*.

The three Japanese species admitted by Jordan and Snyder must then be reduced to two—*S. zebra*, Bloch, and *S. ommatura*, Richardson; but I have to add one from a collection of fishes recently made in the Inland Sea of Japan by Mr. R. Gordon Smith; this new species, belonging to the same section of the genus, is described below under the name of *Synaptura Smithii*. I also describe here a specimen taken by the 'Challenger' in the Arafura Sea, which was referred by Dr. Günther to *S. zebra*, Bloch, but apparently belongs to a hitherto unknown species.

*Synaptura Smithii*, sp. n. (Pl. VI. fig. 1.)

Depth of body  $2\frac{3}{4}$  times in the total length, length of head  $5\frac{1}{2}$  times. Eyes contiguous, the upper scarcely in advance of the lower, subequal in size, their diameter about  $4\frac{1}{2}$  times in the length of head and equal to the length of snout. Mouth extending to below anterior part of eye. Nasal tube long, simple. D. 75; A. 62; C. 17; the posterior rays of dorsal and anal connected to the basal part of the caudal, which is quite distinct and rounded. The width of the base of the caudal fin equal to half the length of head. The upper rays of the right pectoral produced, equal to  $\frac{2}{3}$  the length of head; the left pectoral short, inconspicuous. Sc.  $95\frac{30}{36}$ , ciliated, extending on the bases of the vertical fins in single series up each of the rays, at the most—*i. e.*, on the posterior rays on the ocular side—not more than 8 in each series, not extending to the outer half of the fin; those on the blind side of the head mostly produced into barbel-like processes.

On the ocular side greyish, with nine pairs of dark brown cross-bands on the head and body, extending on to the vertical fins as a series of black blotches. On the blind side pale pink, the vertical fins white at the base and with a broad black border.

A single specimen, 120 millim. in total length, from the Inland Sea, Japan, presented to the British Museum by Mr. R. Gordon Smith.

*Synaptura callizona*, sp. n. (Pl. VI. fig. 2.)

Depth of body  $2\frac{3}{4}$  times in total length, length of head  $5\frac{3}{4}$  times. Eyes contiguous, the upper scarcely in advance of the lower, subequal in size, their diameter about 4 times in the length of head and equal to the length of snout. Mouth

extending to below anterior part of eye. Nasal tube long, simple. D. 82; A. 68; C. 15; the last rays of dorsal and anal connected to the basal part of the caudal, which is rounded and quite distinct. The width of the base of the caudal fin equal to  $\frac{2}{3}$  the length of head. The upper rays of right pectoral produced, equal to  $\frac{2}{3}$  the length of head; the left pectoral short, inconspicuous. Sc.  $108\frac{32}{43}$ , ciliated, extending on to the vertical fins in single series up each of the rays well on to the outer part of the fin, and posteriorly almost to the margin, there being as many as 18 small scales in a series on one of the posterior rays; a few of those on the blind side of the head are produced as barbel-like processes.

On the ocular side greyish, with brownish transverse bands with dark marginal lines on the head and body, the posterior seven of which are simple, the anterior seven, except the one behind the pectoral, bifurcating either in their upper or lower half. Vertical fins greyish, with a series of dark marginal blotches on the ocular side and with the outer half uniform dark brown on the blind side.

A single specimen, 130 millim. in total length, from the Arafura Sea.

#### EXPLANATION OF PLATE VI.

Fig. 1. *Synaptura Smithii*. 1 a. Blind side of head.

Fig. 2. — *callizona*. 2 a. Blind side of head.

[Reduced to  $\frac{5}{8}$ .]

#### VI.—New Forms of Pyralidæ from Spain.

By Sir GEORGE F. HAMPSON, Bart., F.Z.S., &c.

THE following descriptions of new Pyrales are from specimens taken in the Sierra de Bejar, Castille, by Dr. T. A. Chapman, in June and July 1902.

##### PHYCITINÆ.

##### *Asarta nigrella*, sp. n.

Black; head, thorax, and abdomen sparsely irrorated with white; palpi whitish below; tarsi ringed with white; abdomen with fine segmental white lines. Fore wing black, sparsely irrorated with white, without trace of lines. Hind wing black-brown; cilia of male with the terminal half white, of female with slight white tips.

*Hab.* Castille, S. de Bejar. *Exp.* 16–20 millim. Type in B. M.

##### PYRALINÆ.

*Cledeobia moldavica*, Esp., subsp. with the ground-colour black-brown throughout.



VII.—On some Secondary Sexual Characters in the Genus *Aranea*, Linn. By F. PICKARD-CAMBRIDGE, B.A., F.Z.S.

WHILE recently making an analysis of the characters of the spiders belonging to the genus *Aranea* (*Epeira*, auct.), with the object of finding any which might prove valuable in relation to the numerous subdivisions of the group, I have discovered some peculiar to the male sex which have not, I believe, been recorded hitherto.

It is well known that on the coxa of the first pair of legs there is in very many species a hook-like apophysis at its posterior angle beneath, though the use of it has not been recognized. In correlation, however, with this hook I find on the anterior margin of the femora of the second pair of legs, quite at the base, a long groove distally shallow, basally quite deep, bounded in front by a long chitinous ridge. If coxa i. be raised and the second leg depressed this hook will slide down the groove and become locked in the deep pit at the base.

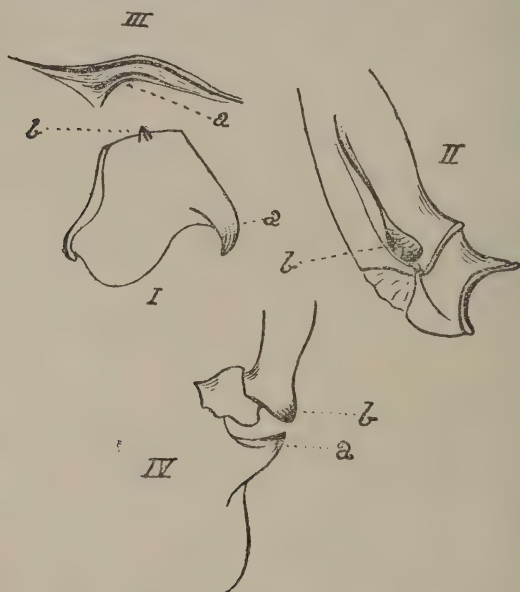
Again, on the upperside of the coxa of leg i. there is in some species (*vertebrata*, McCook, and *purpurascens*, O. P.-Cambr., *e. g.*) a rounded or sharp tubercle which works against a chitinous ridge beneath the raised margin of the carapace. There is, moreover, on the coxal segment of the pedipalp (*maxilla*) towards its distal extremity a sharp tubercle or spur, which is developed in correlation with a chitinous tubercle at the base of the femur of the pedipalp, so that if the pedipalp were moved rapidly from the trochanteral joint the two tubercles would come in contact. This last structure has been found in all the species I have hitherto been able to examine.

At present one can merely record these facts without being able to suggest what may be the precise function of the tubercles and grooves in question. Probably all of them are used, when the male moves the fore legs and palpi rapidly in challenging the female to the combat of love (for it is literally such amongst members of this particular family, in which the former sex often gets the worst of it), in producing a clicking noise to frighten the female and reduce her to a frame of mind sufficiently reasonable to admit of the approach of the male.

Possibly, on the other hand, they may have no such function, but may merely be used for locking the fore legs and the base of the pedipalp, to prevent their being wrenched off in the tussle of holding the female with the specialized clasping-

spines on tibia ii. and performing with the palpi the act of copulation.

I may remark that in those species in which there is no hook on coxa i. of the legs there is also an absence of the specialized groove at the base of femur ii.



*Aranea purpurascens*, O. P.-Cambridge, ♂.

- I. Coxa of the first leg, with (a) the hook-like apophysis and (b) the conical tubercle.
- II. Femur (and trochanter) of the second leg, with (b) the groove into which the hook-like apophysis fits.
- III. Portion of the margin of the carapace, showing at a the chitinous ridge, used in correlation with the tubercle on coxa i.
- IV. Coxa, trochanter, and base of femur of the pedipalp, showing the specialized tubercles, on the coxa at a, on the femur at b.

VIII.—*Notes on Forficulidæ, with Descriptions of new Species in the Collection of the Natural History Museum, South Kensington.* By W. F. KIRBY, F.L.S., F.E.S.

I HAVE now completed the arrangement of the collection of Orthoptera in the Natural History Museum, and am preparing for press my working catalogue of the whole order, which, it is hoped, will be completed in the course of next year.

While comparing the catalogue with the collection, I propose to publish preliminary notes on doubtful points of synonymy and occasional descriptions of new species, which can then be incorporated in the catalogue as printed. The present paper forms the first of the proposed series.

Genus DIPLATYS, Serv.

*Diplatys Ridleyi*, sp. n.

Long. corp. 11 millim.; segm. ult. cum forc.  $2\frac{1}{2}$  millim.

*Female*.—Head black above; labrum shining reddish brown, with a transverse pale yellow stripe at its base; head beneath dull reddish, as are also the antennæ and palpi; second joint of antennæ pale yellow. Pronotum and scutellum tawny; tegmina deep black; wing-scales blackish, bordered within with pale yellow. Abdomen dull red, blackish towards the extremity, and with large black spots on the sides; forceps reddish, upcurved, rather long, with the tips crossing. Legs black, the base and tip of the femora and tibiæ and more or less of the tarsi pale yellow.

*Hab.* Singapore (*H. N. Ridley*).

Allied to the African *D. macrocephala*, Beauv., but in that species the head and legs are not so black and the tegmina are reddish at the base.

Genus PYGIDICRANA, Serv.

*Pygidicrana frontalis*, sp. n.

Long. corp. 18 millim.; segm. ult. cum forcip. 6 millim.; long. tegm.  $3\frac{1}{2}$  millim.; cum alis  $4\frac{1}{2}$  millim.

*Tagalina caffra*, De Bormans (in coll.).

*Male*.—Head testaceous; occiput and sides of hinder lobe as far as the eye, the front except towards the base of the antennæ, and a band from the eyes to the base of the palpi black; antennæ at least 26-jointed, testaceous; pronotum with two very broad blackish or reddish-brown bands, almost meeting behind, and leaving only a long oval space between them and a narrow lateral border, testaceous. Scutellum and tegmina testaceous; the latter with two broad reddish-brown bands on each, only separated by a pale line, the outer bands darker. Wing-scales short, pale yellow, bordered outside with brown. Abdomen reddish brown. Under surface of the body reddish brown, shading into yellowish on the pectus and lower part of the head. Legs testaceous; femora striped above with pale reddish brown. Forceps thick, triquetral, curving inwards to a projecting blunt angle on their

lower surface just beyond the middle, and then raised and converging to meeting points; the inner surface of the terminal curve very finely denticulated.

*Hab.* Cameroons (De Bormans's collection; one specimen, received by him from Brunner von Wattenwyl).

Dohrn's description of *P. caffra* (Stett. ent. Zeit. xxviii. p. 343, 1867) was based on female specimens. It is a larger insect than that here described, and differs in colour and markings. It is possibly the female of the male described and figured as *P. caffra* by Karsch (Berlin. ent. Zeitschr. xxx. p. 87, pl. iii. fig. 5), from Zanzibar. Whether this is so or not, the forceps of the insect figured by Karsch differ so much from those of the two African species here described as new, that it cannot possibly be referred to either of them. De Bormans's description ('Tierreich,' Forf. p. 19) seems to be based upon the descriptions of Dohrn and Karsch.

*Pygidicrana Bettoni*, sp. n.

♂.—Long. corp. 29 millim.; segm. ult. cum forcip. 9 millim.; long. tegm. 4 millim.; cum alis 5 millim.

♀.—Long. corp. 27 millim.; segm. ult. cum forcip. 8 millim.; long. tegm. 4 millim.; cum alis 5 millim.

Head marked as in the last species, but the front testaceous, with a longer or shorter black oval spot in front; antennæ testaceous, 36-jointed; pronotum testaceous, with two broad, widely separated, blackish bands; tegmina reddish brown, with the outer margin narrowly testaceous, and a broad oval spot occupying the centre of the basal half. Wing-scales testaceous. Abdomen reddish brown, paler towards the base in the female; clothed with a greyish pubescence, expanded towards the extremity in the male, and with two tubercles, as in *Labidura*. Forceps of the male nearly as in *P. frontalis*, but more depressed and the projection nearly rectangular; forceps of the female of the usual form, contiguous, and slightly curving upwards. Legs pale yellowish testaceous; femora with a pale reddish stripe, bordered below with black, in the middle of the outer area.

*Hab.* British East Africa (Samburu and Voi); collected by Mr. C. S. Betton. An immature specimen from Nyasaland (Mr. A. Whyte).

*Pygidicrana guttata*, sp. n.

*Pygidicrana guttata*, De Borm., MS.

Long. corp. 21 millim.; segm. ult. cum forcip.  $5\frac{1}{2}$  millim.

*Male*.—Antennæ 26-jointed, joint 2 very short, 3 expanded



at the end, and as long as 4 and 5 together, which are rounded, as also 6 and 7, the succeeding ones becoming gradually longer and slender and then slightly shortening towards the tip. Head above and pronotum dull red; antennæ and palpi paler; hinder part of pronotum bordered with pale yellowish at the sides: tegmina about twice as long as broad, concave on the costal margin; black, with a round tawny spot at the base, and a larger and slightly paler irregular spot at the extremity: wing-scales yellow. Legs reddish tawny; tibiæ shading into yellowish above. Abdomen not expanded at the extremity, but with parallel sides, reddish brown, with a slight greyish pubescence, lightest at the base; forceps shining black, contiguous, upcurved, with the tips crossing. Under surface of head and pectus reddish tawny.

*Hab.* "Bua Kraeng, South Celebes, 5000 feet, February 1896, H. Fruhstorfer" (from De Bormans's collection).

Allied to *P. Horsfieldii*, Kirb., from Java.

*Pygidicrana atriceps*, sp. n.

Long. corp. 15 millim.; segm. ult. cum forcip.  $3\frac{1}{4}$  millim.

*Male.*—Antennæ 24-jointed; head above and front half of pronotum dull black; antennæ, a dot within each eye, palpi, lower mouth-parts except the mentum, which is blackish, and hinder part of pronotum testaceous yellow; tips of antennæ, pectus, and legs rather darker testaceous; intermediate and hind femora with a slender black stripe above. Tegmina dark reddish brown, slightly concave on the costal edge and with a long yellowish spot, pointed towards the end, on the basal half of each. Wing-scales straw-colour. Abdomen chestnut-brown above, pubescent, rather paler beneath, and slightly expanded towards the extremity. Forceps thick, contiguous, denticulate on the lower carina, and with a slight tooth beyond the middle on the upper inner carina; tips turned upwards and crossing.

*Hab.* Rockhampton, Queensland.

Allied to *P. Daemeli*, Dohrn.

Genus LABIDURA, Leach.

This genus falls naturally into four groups, represented by *L. riparia*, Pall., *L. lividipes*, Duf., *L. tenuicornis*, Borm., and *L. Clarki*, Kirb., all of which will perhaps ultimately form the types of distinct genera.

The greatest uncertainty prevails in the first section, in which the males are usually very dissimilar in the shape of

the forceps, while the females are scarcely distinguishable. At present it is uncertain how far this may be a case of sexual polymorphism resembling that of the genus *Forficula*, L., itself (more remarkably in *Odontolabis*, Hope, in the Coleoptera, and *Iliades*, Hübn., and other Equitine genera in the Lepidoptera), or whether the various forms represent closely allied but really distinct species.

*Group of Labidura riparia.*

Much confusion has been caused in this group by Dohrn and De Bormans treating most of the forms belonging to it as subspecies of *L. riparia*, and distributing the various names applied to them under these subspecies, without any regard to the original localities and descriptions. Hence the idea that *L. riparia* is a very variable species, occurring all over the world. The pale typical form described by Pallas from Western Asia is found also in South Europe, North Africa, and perhaps in other parts of Africa; but I doubt if it is indigenous in either South-eastern Asia or America. A large amount of material and, perhaps, breeding experiments would be necessary to throw full light on the question; but in the meantime the following preliminary notes may be useful:—

1. *L. bengalensis*, Dohrn.

Very distinct from any other form in the shape of the forceps in the male, and usually also in the female, but some small females, in which the inner edge of the forceps is less crenulated than usual, somewhat approach large females of *L. riparia*, in which this character is more conspicuous than usual.

There is a broken specimen from Sokotra, perhaps belonging to this species, in the collection, and a very dark female, agreeing better with this species than with any other, from Portugal, collected by Rev. A. E. Eaton.

2. *L. riparia*, Pall.

Undoubted synonyms of the typical form of this species are *gigantea*, Fabr., *bilineata*, Herbst, *maxima*, Vill., and *morbida*, Serv. All other alleged synonyms are more or less doubtful.

Var. *mixta*, Bol.

From Cadiz. Distinguished by having a double black line on the abdomen both above and below. An immature specimen in the Museum from Spain has the double line above, and probably belongs to this form.

Var. *inermis*, Brunn.

Insufficiently described, but wants the two points at the extremity of the abdomen, and the central tooth on the inside of the forceps is nearly obsolete. Recorded by Brunner from Austria and Servia. I identify a light-coloured specimen from Spain with this form.

3. *L. marginella*, Costa.

A small dark form, from Vesuvius, wanting the anal points in the male. Krauss regards it as a local form of *L. riparia*, and as identical with *inermis* of Brunner.

4. *L. bicolor*, Fisch. Waldh. }

5. *L. Fischeri*, Fisch. Waldh. }

Doubtful forms from the north coast of the Black Sea, which will doubtless be recognized when other specimens are brought from that locality. The first is not figured, and the second hardly seems to be a true *Labidura*, judging from the description and figure.

6. *L. distincta*, Rodz.

Another doubtful form from Transcaucasia (unfigured).

7. *L. pallipes*, Fabr.

This name is usually applied to the dark form of *L. riparia*; but the types are lost, and the insect cannot be identified till more specimens are received from its locality, the Cape Verde Islands.

8. *L. herculeana*, Fabr.

A doubtful form from St. Helena. I believe the type is still extant at Kiel.

9. *L. terminalis*, Serv.

A Mauritian insect. There is only one female specimen in the Museum, which is not sufficient to elucidate this form.

10. *L. auditor*, Scudd.

A South-African form (unfigured) which I have not seen.

11. *L. crenata*, Oliv.

A South-African form, without anal points in the male, but with a second smaller tooth on the inner side of the forceps in the male, as in *L. icterica*; the forceps of the female strongly crenulated.

12. *L. icterica*, Serv.

From India, Ceylon, and China. Pale coloured; no anal points; generally a second tooth on the inside of the forceps in the male, and in large specimens the space between the central tooth and the tip crenulated. I regard *L. Servillei*, Dohrn, and *japonica*, De Haan, as probably varieties of this insect. The European specimens called *inermis* may also belong to it.

13. *L. granulosa*, Kirb.

A very large dark-coloured form from the Philippines, of which the Museum now possesses both sexes.

14. *L. pluvialis*, Kirb.

Another very dark form, from Raine Island, Queensland, but narrower than the last.

15. *L. truncata*, sp. n. (*infra*).

There are several other doubtful forms in the Museum which do not agree with any extant descriptions, but which I do not feel justified in describing at present.

16. *L. bidens*, Oliv.

Described from Jamaica: *erythrocephala*, Fabr., South-American Islands; *bivittata*, Burm., from San Domingo, Porto Rico, and Colombia; and *affinis*, Guér., from Cuba, appear to be the same species. It is easily recognizable from the descriptions; but, though agreeing with *L. riparia* in many respects, especially in possessing the anal points wanting in most of the other forms resembling *L. riparia*, I think it is in error that various entomologists have included European and other forms with it as a subspecies of *L. riparia*.

*L. bidens* seems to be common in the West Indies. The Museum has undoubted specimens from Haiti and St. Bartholomew, and also from Mexico.

17. *L. suturalis*, Burm.

Described from Colombia. Distinguished from the last form by wanting the anal points.

*Group of L. lividipes.*18. *L. lividipes*, Duf.

A South-European species which extends to Asia and Africa. The following names are probably synonymous:—



*meridionalis*, Serv., *pallipes*, Duf., *Dufourii*, Scudd., and *inconspicua*, Kirb. I am more doubtful about *castanea*, Serv., described from an unknown locality, and *vicina*, Luc., from Algeria. I am inclined to think that the last insect may possibly be distinct.

*Group of L. tenuicornis.*

19. *L. tenuicornis*, Borm.

A slender species, hardly belonging to the genus.

*Group of L. Clarki.*

20. *L. Clarki*, Kirb.

De Bormans suggests that this species may belong to *Pyrragra*. It does not agree well either with *Pyrragra* or *Labidura*, but one specimen is hardly enough to found a new genus on.

I add here the description of an uncharacterized form of *Labidura*:—

*Labidura truncata*, sp. n.

*Labidura truncata*, Westw., MS.

♂.—Long. corp. 24–30 millim.; segm. ult. cum forcip. 8–10 millim.

♀.—Long. corp. 18–20 millim.; segm. ult. cum forcip. 6–7 millim.

Antennæ at least 29-jointed; body tawny; the thorax except at the edges, the wing-cases except the borders and suture, and the middle of the abdomen except the last segment above, blackish or reddish brown; last segment of abdomen without anal points, but with a small blackish tubercle above the base of each of the forceps. Forceps triquetral, gradually curved, and crossing at the extremities; those of the male crenulated on the inner edge to the middle, where stands a projecting tooth (sometimes nearly obsolete), and there is always a second just before the extremity of the forceps; in the female the forceps are strongly crenulated on the inner side towards the base. The wing-scales in both sexes are usually either absent, or largely developed, covering nearly two segments of the abdomen, and, if developed, they are wholly brown except on the edges.

*Hab.* Australia (Melbourne, Adelaide, Sydney, Moreton Bay).

The male of this form may always be distinguished from

*L. icterica*, Serv., by the second tooth of the forceps being placed, not halfway between the first and the extremity, but close to the extremity; the female, however, is scarcely distinguishable from that of *L. icterica*.

#### Genus DEMOGORGON, Kirb.

De Bormans regards the species of this genus as probably mere varieties of his different subspecies of *Labidura riparia*; but they differ in the invariable absence of wing-scales, in the form of the forceps, and in the peculiar sculpture of the abdomen, and are, to the best of my belief, confined to South America. At present I recognize five species, which may not all be truly distinct:—(1) *lividus*, Dubr.; (2) *Batesii*, Kirb.; (3) *bicolor*, Kirb.; (4) *xanthopus*, Stål (= *adelphus*, Kirb.); (5) *patagon[ic]us*, Kirb.

#### Genus ANISOLABIS, Fieb.

##### *Anisolabis Dubronii*, n. n.

*A. læta*, De Borm. (nec Gerst.).

Gerstæcker's *Brachylabis læta*, from Kilimandjaro, has the sides of segments 6 and 7 of the abdomen and nearly the whole of segment 8 above strongly rugose, which is not the case in De Bormans's supposed *Anisolabis læta* from Tenasserim.

#### Genus SPARATTA, Serv.

##### *Sparatta plana*, Burm.

*S. apicalis*, Kirb., is probably synonymous with this species.

##### *Sparatta Dohrni*, n. n.

*Sparatta plana*, Dohrn & De Borm. (nec Burm.).

#### Genus ANCISTROGASTER, Stål.

##### *Ancistrogaster luctuosa*, Stål, Dohrn.

A Brazilian insect. *Forficula petropolis*, Wood, also from Brazil, comes nearer to the description of this species than to the next, but may be distinct.

##### *Ancistrogaster Burri*, n. n.

*Ancistrogaster luctuosa*, De Bormans.

From Mexico and Central America.

IX.—*Descriptions of Four new Species of West-African Lycænidæ.* By HAMILTON H. C. J. DRUCE, F.E.S., F.Z.S.

*Pseuderesia Gordoni*, sp. n.

♂. Upperside: fore wing uniform dull blackish brown, with a rather narrow reddish-orange streak along the inner margin, commencing beyond the base and extending beyond the middle: hind wing uniform reddish orange, with the anal and outer margins only to the apex broadly and evenly blackish brown.

Underside: fore wing, ground-colour dull blackish brown, paler along the outer margin; two reddish spots in the cell, a rather broad reddish band beyond extending from the costa to the median nervure; the costal margin is dusted with reddish scales towards the base: hind wing with irregular alternate broken bands of orange and brown from the base to beyond the middle, when the ground-colour becomes at first darker and then paler towards the margin.

Head, thorax, and abdomen brown above, abdomen paler below; legs minutely spotted with buff.

Expanse  $1\frac{3}{4}$  inch.

*Hab.* W. Africa, near Benin City, 3rd June, 1902. Type in Mus. Hope, Oxford.

I have named this species after Mr. C. J. M. Gordon, B.A., of Balliol College, who captured it and presented it to the museum. It is not very closely allied to any other described species in the genus, but is perhaps nearest to *P. isca*, Hew.

*Larinopoda brenda*, sp. n.

♂. Allied to *L. lagyra*, Hew.; scarcely differs on the upperside, but the black anteciliary line on hind wings does not appear thickened at the extremity of each nervule.

Underside differs from that of *L. lagyra* by having a sub-marginal row of somewhat triangular brownish spots on the hind wing commencing below the big spot near the apex and extending to the anal angle, situated in the internervular spaces; towards the anal angle the margin is clouded with pale brown. As in *L. lagyra*, there is no black spot in the cell and the minute dot on the nervule closing the cell is present.

Expanse  $1\frac{3}{4}$  inch.

*Hab.* Benin City, 6th May, 1902 (C. J. M. Gordon).  
Type in Mus. Hope, Oxford.

Professor Poulton has asked Dr. Dixey to look at this butterfly, in order, if possible, to arrive at an opinion as to the existence of any special Pierine model. He says:—"The Lycanid bears an undoubted general resemblance to a number of the Pierine subfamily, but I do not know of any Pierine form *specially* corresponding to it. Perhaps the nearest to it are the W.-African members of the genus *Phrissura*, which are no doubt convergent with *Mylothris*. Submarginal spots on the underside of hind wing are found in W.-African species of *Pinacopteryx* and also in *Belenois calypso*."

I have named it *brenda* on account of its close resemblance to *Terias brenda*, D. & H., ♀.

In addition to the above Mr. Gordon has also sent a *Larinpoda* from Benin which is identical with *L. aspidos*, mihi, from Lagos. Mr. Grose Smith has described one from Benin\* the type of which I have not seen, but which Professor Aurivillius thinks probably = *L. aspidos* (Rhop. Æthiop. p. 273, no. 4, 1898).

*Epitola Gordoni*, sp. n.

♂. Allied to *E. Staudingeri*, Kirby, from which it differs on the underside by both wings being crossed by bands of pale crescent-shaped lunules. On the fore wing there is a narrow whitish band placed beyond the cell, reaching to a rather broad whitish patch near the inner margin beyond the middle; beyond this band a pale, indistinct, much broken, linear band commencing on the costa and ending before the middle; beyond this and close to the outer margin a double row of pale crescent-shaped markings, forming two linear bands. Hind wings with an indistinct, much broken, linear band at the end of the cell; beyond that, about halfway to the margin, a still more broken linear band, followed by a double row of submarginal markings, as in the fore wing.

Expanse  $1\frac{3}{8}$  inch.

*Hab.* Bonny, 6th May, 1902 (C. J. M. Gordon). Type in Mus. Hope, Oxford.

Possibly this insect may turn out to be a form of *E. Staudingeri*, which I know only from the figure and description, as it appears to be the same on the upperside; but on the underside Mr. Kirby's species is described as being without markings.

\* *Larinpoda latimarginata*, Grose Smith, Nov. Zool. v. p. 354 (1898).



Besides the three species described above, Mr. Gordon has sent some other interesting species of Lipteninae to the Hope Museum, and amongst them are:—*Tetraharnis ilma*, Hew., and var. *simplex*, Auriv., from Bonny; *Pseuderesia libentina*, Hew., and *Citrinophila similis*, Kirby (which has an extraordinary resemblance to *Terias brigitta*), from Siloko; *Liptena campinus*, Holland, captured near Warrige; *Liptena* sp. near *lybia*, Staudinger, from Sapele; and several specimens of a *Phytala* which I have been unable to determine.

*Epamera mirabilis*, sp. n.

♂. Allied to *Epamera iasis*, Hew.\*

Upperside rather darker blue. Fore wings with the apical and costal areas more broadly black, the inner margin very distinctly concave, but not so markedly as in *E. iasis*, and without the notch beyond the middle, and with no trace of the white edging so conspicuous in that species. Hind wing with the apex more broadly black; the abdominal folds blacker and dusted with blue scales almost up to the white cilia, especially towards the base, with the shining patch much whiter, not bordered with pure white as in *E. iasis*, and without any internal patch of differently placed rough-looking scales.

The underside differs from that of *E. iasis* by the apex and outer margin of the fore wing being clouded with pale brown, by the ultra-median line being more distinct, and by the shining patch being more conspicuous and extensive, *i. e.* reaching broadly to the outer angle, where it becomes blackish and darker towards the margin; the inner margin is entirely without the row of long hairs which are so conspicuous a character in *E. iasis*. Head, thorax, and abdomen blackish above, white below; legs white, with black spots; frons yellow.

Expanse  $1\frac{2}{3}$  inch.

*Hab.* Sierra Leone, W. Africa (Mus. Druce).

This species is one of very considerable interest on account of the entire absence of the usual patch of differently placed scales on the large shining space of the hind wing above and also of the row of long hairs attached to the inner margin of the hind wing below. I know of no other butterfly of the family to which these remarks can apply, unless it be the South-American *Thecla barajo*, Rkt., which has a large shining patch on the hind wing above, but the shining area

\* *Iolais iasis*, Hew. Ill. Diurn. Lep. p. 42, t. xix. figs. 11, 12 (1865).

does not in any way affect the coloration of the wings and can scarcely be compared to the patches on the *Iolaus* group. *E. mirabilis* seems to open up the question very forcibly as to whether distinctive genera can be made on the absence or presence of these "sexual marks." It appears to agree in venation exactly with *Epamera*.

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X.—On some undescribed *Rhynchota*.

By W. L. DISTANT.

Fam. Pentatomidæ.

*ACANTHOSOMATINÆ*.

*Sastragala smaragdina*, sp. n.

Very pale greenish; central lobe and margins of head, the transverse foveæ near anterior margin of pronotum, corium, legs above, and abdominal margins more olivaceous green; lateral angles of the pronotum spinously produced, black, and from a line drawn between them to base the surface is thickly coarsely punctate, the punctures castaneous; scutellum with a large discal, levigate, ochraceous spot, remaining surface coarsely darkly punctate, apex levigate; corium with a black spot at inner angle and a lunate black fascia near outer apical margin; connexivum pale greenish, with the extreme apices of the segmental spines black; posterior margin of sixth segment black.

Closely allied in structure and markings to *S. heterospila*, Walk., but with the lateral pronotal spines much more slender and acute; abdominal spine also much more acute and with its apex more removed from the sternal surface.

Long. 11; exp. pronot. angl. 8 millim.

*Hab.* Ceylon: Kandy (*E. E. Green*).

Fam. Lygæidæ.

*APHANINÆ*.

ALTOMARUS, gen. nov.

Elongate; head long, antecular portion about as long as postocular portion, angularly produced in front of eyes; first joint of antennæ about reaching the apex of head; rostrum long, about reaching the intermediate coxæ, first joint much shorter than head, just passing the region of the eyes; pronotum with

a very distinct anterior collar, anterior lobe slightly longer but much narrower than posterior lobe, subglobose, its margins convex; posterior lobe slightly gibbous, the lateral angles rounded and subprominent; scutellum elongately triangular; corium moderately widened towards apex, its apical margins straight; membrane passing the abdominal apex; anterior femora incrassated, armed beneath with a series of long spines; anterior tibiæ a little shorter than the femora and slightly curved; intermediate and posterior legs slender.

I place this genus near *Bedunia*, Stål.

*Altomarus Greeni*, sp. n.

Head, pronotum, scutellum, and sternum shining black; abdomen shining piceous; corium pale castaneous; antennæ, anterior pronotal collar, apex of scutellum, basal half of lateral margin, a spot before apex, one at inner angle, and venation of corium and the legs pale ochraceous; first joint of antennæ and apical half of fourth joint and subapical annulation to femora piceous. Head very coarsely punctate; anterior pronotal lobe impunctate, posterior lobe and scutellum finely punctate; corium linearly punctate; membrane pale brownish, with three distinct pale apical spots; antennæ with the first joint shortest, second longest, fourth a little longer than third.

Long. 5 millim.

*Hab.* Ceylon: Gampola (*E. E. Green*).

*ARTEMIDORUS*, gen. nov.

Elongate; abdomen concavely narrowed near middle. Head broad, convexly narrowed in front of eyes, central lobe prominent and slightly produced; antennæ with the first joint almost as long as the head and moderately incrassate at apex, second joint slightly longer than third or fourth, all longer than first; rostrum just passing the anterior coxæ, first joint shorter than head, second longest, ocelli close to posterior margin, nearer eyes than to each other; pronotum elongate, strongly laterally sinuate, transverse constriction distinct, anterior lobe not prominently globose, posterior lobe deflected anteriorly, lateral angles rounded, their posterior margins slightly lobately produced; scutellum large, with a discal carination; corium about half the length of abdomen and concavely constricted at middle; membrane not quite reaching apex of abdomen; legs somewhat long, unarmed, posterior femora with their apices incrassated; legs pilose, posterior tibiæ setose.

A distinct genus of *Aphaninæ*.

*Artemidorus pressus*, sp. n.

Pale ochraceous; head, anterior lobe of pronotum, lateral margins of posterior lobe, base of scutellum, body beneath, and almost apical halves of posterior femora black; apex of scutellum luteous, levigate, the central carination castaneous; posterior lobe of pronotum, subapical area of scutellum, and corium darkly punctate, the outer areas of corium impunctate, their apices black; acetabula, coxæ, linear marginal spots to abdomen (above and beneath) luteous; apex of abdomen castaneous. Body, antennæ, and legs finely pilose, posterior tibiæ setose; head, pronotum, and sternum thickly punctate.

Long.  $5\frac{1}{2}$  millim.

*Hab.* Ceylon: Peradeniya (*E. E. Green*).

## ENTISBERUS, gen. nov.

Subelongate; head triangular, narrowly produced anteriorly, where it is bicarinate; eyes moderately large and prominent, somewhat exserted, their posterior margins almost touching the anterior margin of the pronotum; antennæ robust, apical joint thickened, third joint about as long as first; rostrum almost reaching the intermediate coxæ, basal joint a little shorter than head; pronotum with the posterior lobe much wider than the anterior lobe, central constriction well defined, anterior lobe subglobose, posterior angles subprominent and obtusely subacute, their basal margins obliquely excavate; scutellum with a discal cruciform elevation; corium extending to more than half the length of abdomen, the apical margin slightly sinuate; membrane slightly passing the apex of abdomen; femora unarmed.

I place this genus near *Rhodiginus*.

*Entisberus archetypus*, sp. n.

Head, anterior lobe of pronotum, and body beneath black; posterior lobe of pronotum and corium ochraceous, punctured with brown, the first thickly punctate, the corium with the clavus, claval margin, irregular transverse fascia, and apex thickly punctate, enclosing a small pale spot at inner angle and another on lateral margin a little before apex; scutellum piceous, coarsely punctate, the cruciform carination ochraceous; membrane hyaline; antennæ, rostrum, and legs pale stramineous, apical joint of antennæ roseate; coxæ black; lateral angles of metasternum and anal segment castaneous. Body beneath sparingly and finely greyishly pilose; antennæ with the first joint a little thickened, second joint slender,



about as long or a little longer than the first, third shorter than second, thickened towards apex, fourth shortest, stoutest, globose.

Long. 3 millim.

*Hab.* Ceylon: Peradeniya (*E. E. Green*).

Fam. Reduviidæ.

*HARPACTORINÆ.*

*Harpactor pygmæus*, sp. n.

Head, anterior lobe of pronotum, anterior areas of sternal segments, coxæ, and legs black; posterior pronotal lobe, broad biannulations to femora, connexivum, sternum, and abdomen pale sanguineous; head beneath and corium luteous; scutellum piceous, centrally reddish brown; membrane pale bronzy. Second joint of rostrum longer than the first; postocular portion of head longer than anteocular portion; head about as long as the pronotum; antennæ piceous; connexivum with a black spot on the last three segments.

Long. 7 millim.

*Hab.* Nilgiri Hills (*Sir G. F. Hampson*).

*Harpactor nilgiriensis*, sp. n.

Head, lateral areas of meso- and metasterna, intermediate and posterior coxæ, legs, and abdomen above black; posterior lobe of pronotum, corium, spots to connexivum, fascia to head beneath, and abdomen beneath luteous; broad biannulations to femora, rostrum, anterior coxæ, and anterior lobe of pronotum reddish ochraceous; antennæ piceous, first joint (excluding base and apex) brownish ochraceous. Second joint of rostrum longer than the first; postocular portion of head much longer than anteocular portion; head about as long as pronotum; membrane pale bronzy.

Long.  $8\frac{1}{2}$  millim.

*Hab.* Nilgiri Hills (*Sir G. F. Hampson*).

*Sphedanolestes annulipes*, sp. n.

Black; pronotum, prosternum, and anterior and intermediate coxæ sanguineous; connexivum, biannulations to femora, head beneath, first joint of rostrum (excluding base), and abdomen beneath pale creamy luteous; marginal areas of abdomen with tessellate black markings enclosing two series of large luteous spots; connexivum above with the last two segmental incisures black. Second joint of rostrum longer

than the first; postocular portion of the head longer than the anteocular portion; head about as long as the pronotum, which has the central sulcation profound and the posterior angles subprominent and rounded.

The pronotum varies in colour from sanguineous to reddish ochraceous; the scutellum is either of that colour or with its margins and apex black or entirely black; the pronotal posterior angles are sometimes black.

Long. 8 millim.

*Hab.* Burma: Karennee, Bhamo (*Fea*).

*Endochus subniger*, sp. n.

Black; corium, rostrum, disk of mesosternum, coxæ, and legs luteous; a subapical annulation to anterior femora, apices of intermediate and posterior femora, and subbasal annulations to tibiæ black. Postocular portion of head longer than the anteocular portion; first joint of antennæ about as long as the abdomen; anterior lobe of pronotum discally foveate, posterior lateral angles spinously produced; abdomen and corium strongly concavely constricted at centre.

Long.  $14\frac{1}{2}$ ; exp. pronot. angl.  $3\frac{1}{2}$  millim.

*Hab.* Burma: Karennee.

*Endochus merula*, sp. n.

Black; two discal spots to mesosternum and a narrow lateral abdominal margin obscure brownish ochreous. Postocular portion of the head considerably longer than the anteocular portion; first joint of antennæ almost as long as the abdomen; pronotum with the anterior lobe distinctly broadly foveate on posterior disk, posterior lobe transversely rugose, the lateral angles spinously produced and directed slightly backward; membrane very dark cupreous, slightly passing the abdominal apex.

Long.  $15\frac{1}{2}$ ; exp. pronot. angl.  $3\frac{1}{2}$  millim.

*Hab.* Burma: Karennee.

*Panthous tarsatus*, sp. n.

Ochraceous; corium testaceous; tarsi and extreme apices of tibiæ piceous; antennæ mutilated; pronotum strongly rugose, anterior lobe gibbous, sulcately divided at centre, lateral angles somewhat prominently produced, their apices moderately obliquely truncate, posterior margin strongly convexly produced; membrane considerably passing apex of abdomen; legs pilose, the femora and tibiæ strongly nodulose; rostrum about reaching the anterior coxæ.

Long. (includ. membr.) 16; exp. pronot. angl.  $5\frac{1}{2}$  millim.

*Hab.* Malay Peninsula: Perak.

*Coranus atricapillus*, sp. n.

Head, anterior lobe of pronotum, scutellum, membrane, and prosternum black; posterior lobe of pronotum, corium, and body beneath pale castaneous; connexivum above and beneath black, spotted with luteous; legs luteous, femora annulated with piceous, bases and apices of tibiæ, and tarsi (excluding base), piceous; antennæ piceous, basal joint (excluding base and apex) luteous; rostrum luteous, with its apex piceous; femora moderately nodulose; head strongly transversely impressed between eyes; scutellum with carina non-erect; anterior lobe of pronotum deeply sulcate; lateral pronotal angles rounded, subprominent, basal margin concave.

Long.  $8\frac{1}{2}$  millim.

Hab. Ceylon (*G. Lewis*).

*Pristhesancus melitus*, sp. n.

Dull luteous, pilose; first and second segments of connexivum, small stigmatal abdominal spots, and extreme apices of the femora black. Anterior pronotal lobe with the anterior angles tuberculously prominent and with two long, erect, spinous tubercles, lateral and posterior pronotal angles tuberculously produced; a long erect spinous tubercle at base of scutellum; connexivum broad and reflexed upward; membrane about reaching abdominal apex.

Long. 21; exp. pronot. angl.  $6\frac{1}{2}$  millim.

Hab. Queensland: Rockhampton.

*Pristhesancus chrysitis*, sp. n.

Head, pronotum, scutellum, corium, rostrum, antennæ, sternum, and legs ochraceous; abdomen shining indigo-blue; inner marginal spots to connexivum, four large submarginal spots to abdomen beneath, and abdominal apex ochraceous; membrane very pale ochraceous, semihyaline; basal joint of antennæ about as long as anterior femora; anterior lobe of pronotum with the anterior angles moderately prominent and with four discal tubercles, of which the two anterior are very small and the posterior two long and obliquely erect; lateral and posterior pronotal angles somewhat prominently tuberculously produced; scutellum with a long, obliquely erect, basal, spinous tubercle, its apex also, but much less, spinously tuberculous; membrane just passing abdominal apex.

Long., ♂ ♀, 19-23; exp. pronot. angl. 6-8 millim.

Hab. Murray Island.

## XI.—On a remarkable new Hare from Cape Colony.

By OLDFIELD THOMAS.

IN a further consignment of mammals from Deelfontein, Cape Colony, collected by Mr. C. H. B. Grant, and presented to the National Museum by Col. A. T. Sloggett, occur two specimens of a hare of an entirely different type to anything hitherto known, either from South Africa or elsewhere. At first sight appearing allied to the Cape Red-tailed Rabbit (*Oryctolagus crassicaudatus*), it is really a true *Lepus*, as is shown by the structure of its skull and molars.

It may be called

*Lepus monticularis*\*, sp. n.

Size about as in *O. crassicaudatus*. Fur of medium length, soft and fine, but not woolly. General colour above, of head and back, clear finely grizzled "drab-grey" without rufous suffusion. Individually the long hairs are black with a sub-terminal ring of pale drabby white, while the underfur is pale slaty grey at base and dull buffy terminally. Sides dark drab, taking on a tinge of rufous below. Head like back, a prominent whitish ring round each eye. Ears of medium length, their backs greyish brown with a very fine narrow edging of black terminally; inner surface more yellowish. Nape-patch deep rich rufous, strongly contrasted with the general colour. Under surface very strikingly coloured—the chin yellowish white with the bases of the hairs slaty, sharply separated from the grey of the cheeks by an indistinct blackish line; throat grizzled drab; sternal region and inner side of forearms bright pinkish buff; lower belly whitish; anal region and inner side of legs darker pinkish buff: there are, therefore, in succession five different colours from mouth to anus. Front and outer surfaces of arms and legs drabby brown with a slight vinaceous tone; long hairs of palms yellowish, soles smoky grey, the hairs on the digits dull yellow. Tail, as in *O. crassicaudatus*, thick, round, uniform in colour above and below, therefore strikingly different from the black and white tails of *L. capensis* and *saxatilis*; its colour pale vinaceous brown with the extreme tip black.

Skull in general form most like that of *L. capensis*; rather smaller, with smaller nasals and rather greater intertemporal

\* "Kopje," diminutive of Kop, a head, bluff, or mountain; therefore = "Monticulus," a little mountain.



breadth; occipital shelf strongly narrowing posteriorly; zygomata practically without projecting antero-external shoulders; palatal foramina large and widely open; palatal bridge quite narrow; bullæ of medium size. Incisors of a very simple pattern, the enamel not penetrating into the tooth at all, but merely following its anterior outline; inner segment of each tooth two thirds the breadth of the outer. Molars as in true *Lepus*, not as in *Oryctolagus crassicaudatus*.

Dimensions of the type (measured in the flesh):—

Head and body 398 millim.; tail 76, with hair 100; hind foot 107; ear 107.

Skull: greatest length 80·5; basilar length 63; zygomatic breadth 37; nasals 33 (diagonally)  $\times$  16; interorbital breadth 14; intertemporal breadth 13·5; length of palatal foramina 20; breadth of palatal bridge 5·2; antero-posterior diameter of bullæ 12·3.

*Hab.* Deelfontein, Cape Colony.

*Type.* Female. Original number 284. Collected 24th May, 1902, by Trooper C. H. B. Grant and presented by Col. A. T. Sloggett, R.A.M.C.

To the three types of hare found in South Africa, *L. capensis*, *L. saxatilis*, and *O. crassicaudatus*, all of them obtained at Deelfontein, the present adds a fourth very distinct one, without near allies anywhere.

Although with a general resemblance to *O. crassicaudatus*, with which it shares the characteristic form of the tail, it may be distinguished externally by its brownish-drab instead of rufous tail, the absence of rufous suffusion in its body-colour, the presence of a narrow line of black round the tips of the ears, and the striking coloration of the under surface. Finally, the skull shows that it has no real relationship to that animal, but is more nearly allied to *L. capensis*.

Col. Sloggett and Mr. Grant are to be congratulated on the discovery of this very remarkable hare, the most distinct that has been described for a long time.

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## XII.—On Two new *Squirrels* of the *Funisciurus pyrrhopus* Group. By OLDFIELD THOMAS.

### *Funisciurus mandingo*, sp. n.

A small pale form allied to *F. leucostigma*, with the red of the flanks and limbs almost obsolete.

General colour above coarsely grizzled pale olivaceous, much paler than in the allied species. Light stripes present,

but far less conspicuous than usual, dull yellowish ; the darker region below them hardly perceptible, not contrasting with the colour of the flanks. Under surface dull creamy yellow, not sharply defined, the bases of the hairs slaty grey. Muzzle yellowish, a narrow dark line on its centre above. Cheeks with the lineated arrangement found in this group wherever the strong red of the sides does not overpower it ; lines of the upper and lower eyelids yellow, separated by a darker spot in front of and darker line behind the eye. Ears short, dull greyish, the lower part of their backs and a spot behind them dull white. Cheeks below ears, sides of neck, shoulders, flanks, and hips dull fulvous, very different to the conspicuous reddish of the allied forms. Front of forearms and upper surface of hands and feet dull grizzled yellowish. Hairs of tail above annulated black and white, with white tips ; below dull ochraceous basally, black subterminally, and white terminally.

Skull not preserved.

Dimensions of the type (measured in skin) :—

Head and body 190 millim. ; tail 158 ; hind foot (s. u.) 41.

*Hab.* Nianimaru, Gambia.

*Type.* Male. B.M. no. 99. 12. 6. 2. Original number 106. Collected 15th January, 1899, and presented by J. S. Budgett, Esq.

This squirrel is most nearly allied to *F. leucostigma*, of which it forms a pale Gambian representative.

*Funisciurus raptorum*, sp. n.

A dark form of the group, with the red on sides and flanks almost obsolete.

General colour above dark blackish olivaceous, darker than in ordinary specimens of *F. leucostigma*. Light lines narrow, conspicuous, white instead of the usual yellow ; a well-defined dark band below them. Flanks dull brownish, scarcely rufous. Under surface dull cream-white throughout, the hairs white to their roots. Crown blackish, darker than the back. Sides of face lineated, very much as in *F. mystax*, de Wint. ; a light orange line running along above the eye, another below it, these being separated by a dark line through it. Cheeks, like flanks, brown, scarcely rufous ; shoulders and hips dull rufous brown, which colour is continued down to the wrists and ankles ; hands and feet greyish brown, with a tinge of yellowish. Tail-hairs above blackish at base, then dull yellowish, with a black subterminal and white terminal band ; centre of under surface dull fulvous.

Molars of the ordinary character, not as in *F. mystax* \*.

Dimensions of the type (measured in skin):—

Head and body 190 millim.; tail 155; hind foot (s. u.) 41.

Skull: greatest length 46; basilar length 34; length of upper molar series (*mp*<sup>1</sup> and 3 molars) 7.5.

*Hab.* Forçados, Lower Nigeria.

*Type.* Immature male. B.M. no. 2. 11. 2. 15. Original number 10. Collected 31st December, 1901, by Dr. W. J. Ansorge.

This species differs from *F. pyrrhopus* and *F. leucostigma* by the almost complete suppression of the red of the cheeks, limbs, and flanks, and the whiteness of its light dorsal lines, from *F. mystax* by these lines being much more conspicuous, and by its white under surface, and from *F. mandingo* by its generally darker colour.

### XIII.—On some Genera and Species of South-American Aviculariidae. By R. I. POCKOCK.

#### Genus AVICULARIA, Lam.

##### *Avicularia minatrix*, sp. n.

♀.—*Colour.* Carapace and upperside of appendages covered with olive-grey hairs, showing a delicate tinge of pink; a conspicuous fringe of pink hairs at the extremity of the tibial and protarsal segments of the legs on the dorsal side, a similar but shorter and less noticeable fringe on the extremity of the patella; hairy fringe at the extremity of the tarsus much less noticeably red than that of the protarsus; sternum, coxæ, and underside of abdomen sooty black, upperside of abdomen vividly black and red; the median line occupied by a broadish black stripe, whence five pairs of black stripes pass transversely over the sides of the abdomen; the spaces between these stripes red, hence the lateral surface of the abdomen might be described as ornamented with alternate bands of black and red; the red stripes wider dorsally; the black stripes are narrowest at their point of origin from the median stripe.

*Carapace* as long as patella + tibia + tarsus of palp, almost half the length of the third leg (measured from the base of the femur), and slightly longer than patella + tibia of first or

\* Cf. de Winton, Ann. & Mag. Nat. Hist. (7) ii. p. 10 (1893).

fourth leg and than protarsus+tarsus of the fourth; its width equal to patella+tibia of second leg.

*Legs* 4, 1, 2, 3, fourth exceeding first by about half the length of its tarsus.

*Measurements in millimetres*.—Total length 33; carapace 13.5; first leg 33, second 30, third 28, fourth 35; patella+tibia of fourth 12.5, of first 12.

*Loc.* Duaca, Estrado Lara in Venezuela. A single adult female.

This species may be known by the unusual shortness of its legs and the coloration of the abdomen, which suggest that of the young *A. avicularia*. In no other species known to me is the carapace longer than the patella+tibia or protarsus+tarsus of the fourth leg. In the presence of a pale fringe at the extremity of the tibiæ and protarsi of the legs may be seen similarity to *A. Walckenaerii*.

### Genus PSALMOPÆUS, Poc.

#### *Psalmopæus ecclesiasticus*, sp. n.

♂.—*Colour*. Carapace covered with a thick felting of olive-yellow hairs, shining with silky lustre, similar hairs present also upon the upperside of the basal segments of the legs and palpi and upon the summit of the mandibles; prevailing tint of legs mouse-brown; upperside of abdomen with its greyish integument covered with erect bristles of a dark brownish hue; ventral surface sooty velvety black; scopolæ olive-grey.

*Carapace* a little longer than wide, its length equal to that of tibia of second leg, a little less than that of fourth, and shorter than protarsus of fourth by about one fourth of its length, and about as long as patella+tibia of palp and as femur of third leg.

*Legs* long, 4, 1, 2, 3, thickly fringed; patella+tibia of second as long as those of fourth; first leg (from base of femur) about four and a half times as long as carapace.

*Palp* (from base of femur) about twice as long as carapace; palpal organ long, distinctly longer than patella of palp and about half as long as the carapace, the bulb less globular and the spine much longer than in *P. Cambridgi*; viewed from the outside, the posterior border of the spine is continuous with that of the palp.

*Stridulating-spines* on maxilla consisting of a row of nearly a dozen spines, which, except for their thickness and darker colour, are but little differentiated from the oral fringe; on the



mandible there are a few stout but apically setiform spines on the proximal side of the oral fringe.

♀.—Resembling the male, but with shorter limbs; carapace about as long as patella + tibia of third leg, shorter than those of fourth by about one fourth of the tibia.

*Measurements in millimetres.*—♂. Total length 35; carapace 15.5; palpus 31; first leg 71, second leg 66, third leg 56, fourth leg 68 (all from base of femur); protarsus of fourth 18, of first 15.5; patella + tibia of first 26, of fourth 23.5; palpal organ 7.

♀. Total length 39; carapace 17; palpus 33; first leg 58, second leg 55, third leg 47, fourth leg 57; patella + tibia of first 22, of fourth 20.5.

*Loc.* N.W. Ecuador, Rio Sapayo, 450 feet (type); also Carondelet, 60 feet.

Both sexes of this species may be distinguished from those of the Trinidad form *P. Cambridgii*, Poc., by having the stridulating-spines on the palpus only about twelve in number, short, of tolerable even thickness throughout, and not separated from the oral fringe. In *P. Cambridgii* the spines are much more numerous, long, distally incrassate, and forming a strongly curved series remote from the oral fringe. Again, the male of *P. ecclesiasticus* has longer legs than that of *P. Cambridgii*, the carapace in the latter being a little longer than the tibia of the fourth leg, equal to its protarsus, longer than the tibia of the second; the palpal organ is about one third the length of the carapace and equal to the patella of the palp.

*Psalmopæus plantaris*, sp. n.

♀.—*Colour* (dry specimen). Carapace and upperside of limbs covered with olive or greenish-yellow hairs; protarsi and tarsi richer reddish brown, with a very distinct pale, probably pinkish patch at the extremities; a similar but double patch at the extremity of the tibia; sternum, under-side of abdomen and of palpus, and first two pairs of legs velvety brown (probably black).

*Carapace* a little shorter than patella + tibia of first leg, as long as those of second, longer than protarsus + tarsus of first. Anterior median *eyes* about three fourths of a diameter apart and about half their own radius from the laterals.

*Legs* hirsute, like those of *Avicularia*, not nearly so strongly fringed as those of *P. ecclesiasticus* or *P. Cambridgii*; the scopulæ very broad, that of protarsus of first as broad as long; anterior legs shorter; fourth leg a little longer than first,

patella + tibia of fourth a little longer than those of first, also its protarsus + tarsus longer than those of first.

*Stridulating-organ* like that of *P. Cambridgii*, but the spines on the maxilla less numerous, being only about twelve in number and shorter.

*Measurements in millimetres*.—Total length 23; carapace 14.5; first leg 42, second leg 38.3, third leg 35.5, fourth leg 43.5; patella + tibia of first 16, of fourth 15.5; protarsus + tarsus of first 14, of fourth 16.

*Loc.* Cauca in Colombia (received from M. Goudot in 1846).

This species is easily distinguishable from *P. Cambridgii*, which in the structure of its stridulating-organ it more nearly resembles than does *P. ecclesiasticus*, by the shortness of its anterior legs as compared with the posterior.

*Psalmopæus emeraldus*, sp. n.

♀.—*Colour* (dry specimen) a tolerably uniform deep olive-brown above, sooty black below.

*Carapace* almost as long as patella + tibia of first or of fourth leg, a little longer than protarsus + tarsus of first and almost as long as those of fourth.

*Legs* of first and fourth pairs subequal, patella + tibia of first subequal to those of fourth, protarsus + tarsus of fourth a little longer than those of first.

*Stridulating-bristles* on maxilla not isolated from the oral fringe, distally on the same straight line with them and but little differentiated, those at the proximal end longish and slender, much like the rest of the series, not short, thick, and curved as in *P. ecclesiasticus*.

*Measurements in millimetres*.—Total length 28; carapace 13; first leg 37, fourth leg 38; patella + tibia of first 13.5, of fourth 13.8; protarsus + tarsus of first 12.5, of fourth 14.

*Loc.* Colombia, emerald-mines at Muzo, in the valley of the Meta, an affluent of the Magdaleine (*I. da Costa*).

Easily distinguishable from *P. ecclesiasticus*, which it approaches in the structure of its stridulating-bristles, by the greater shortness of its legs, &c.

The females of the foregoing species may be distinguished as follows:—

- a. Stridulating-spines on maxilla in the same straight line as the edge of the oral fringe and scarcely separated from it.
- a<sup>1</sup>. Carapace scarcely longer than femur of first or fourth leg, much shorter than their patella + tibia. *ecclesiasticus*.

- b*<sup>1</sup>. Carapace much longer than femur of first or fourth leg and slightly exceeding their patella+tibia .. *emeraldus*.
- b*. Stridulating-spines on maxilla forming a convex curvature, the middle of which is remote from the oral fringe and nearer the coxal groove.
- a*<sup>2</sup>. Carapace as long as tibia+ $\frac{1}{2}$  patella of first leg, shorter than protarsus+tarsus of first or second; patella+tibia+protarsus+tarsus of first longer than those of fourth ..... *Cambridgii*.
- b*<sup>2</sup>. Carapace as long as tibia+ $\frac{3}{4}$  patella of first leg, longer than protarsus+tarsus of first or second; patella+tibia+protarsus+tarsus of first shorter than those of fourth ..... *plantaris*.

Genus EPHEBOPUS, Sim.

*Ephebopus*, Simon, Pocock, Ann. & Mag. Nat. Hist. (7) viii. p. 547 (1901).

*Ephebopus fossor*, sp. n.

♀.—*Colour* like that of *E. murinus* (= *Santaremia Pocockii*), but the longitudinal bands on the legs less conspicuous and narrower, those on the anterior patella being separated throughout their length; furthermore the legs are ornamented with distinct transverse bands on the distal ends of the patellæ, tibiæ, and protarsi.

*Carapace* as long as patella+tibia or protarsus+tarsus of fourth leg, slightly less than tibia+protarsus of first and than patella+tibia+tarsus of palp; *eyes* of anterior line subequal and subequally spaced, the medians separated by a space which is equal to about three fourths their diameter.

*Legs* 4, 1, 2, 3, fourth exceeding first by about the length of half its tarsus; tibia of first with a pair of inferior apical spines, of second with a single apical spine on inner side, of third and fourth unspined; protarsus of first and second unspined apically beneath, of third and fourth with a single pair of apical spines.

*Labium* flat.

*Measurements in millimetres*.—Total length 33; carapace 14; palpus 23; first leg 37.5, second 35, third 32, fourth 39 (all from base of femur).

*Loc.* Rio Sapayo, N.W. Ecuador, 450 feet.

The Amazonian form *E. murinus* (= *Pocockii*) may be distinguished as follows from the new species here described:—the legs have thicker longitudinal bands and scarcely developed transverse bands; the labium is convex; the eyes compact, the anterior medians being barely a radius apart; the tibiæ of all the legs have a pair of inferior spines, the protarsi of third and fourth have four or five apical spines below.

## Genus ACANTHOSCURRIA, Auss.

*Acanthoscurria antillensis*, sp. n.

? *Mygale Blondii*, Walck. Ins. Apt. i. p. 210 (1837) (in part).

♀.—Integument covered with hairs of a rich olive-brown hue, a pair of pale patches (probably pink in colour when fresh) on the head; legs marked with indistinct pale longitudinal lines, but scarcely distinctly banded at the ends of the segments; bristles on legs greyish in colour, not long and not numerous.

*Carapace* with the cephalic area noticeably higher and narrower than in *A. geniculata* and *A. Brocklehursti*, as long as patella + tibia of fourth leg, a little shorter than those of first leg, and a little longer than protarsus +  $\frac{1}{2}$  the tarsus of the fourth, shorter by  $\frac{1}{4}$  of the tarsus than the patella, tibia, and tarsus of palp, and shorter than the femur +  $\frac{1}{2}$  the patella of the first; distance from the fovea to the anterior border less than protarsus of fourth and barely exceeding patella + tibia of palp.

*Eyes* of anterior line subequal, subequally spaced, medians about a diameter apart, posterior median eyes close to the posterior laterals, much closer than to the anterior medians; the two laterals less than half a diameter apart.

*Legs* 4, 1, 2, 3 in length; spines on anterior tibiae very short, protarsus of first spined only at apex; fourth leg about three times as long as carapace; third leg less than two and a half times as long; palp more than one and a half times as long.

*Stridulating-organ* consisting of about 25 long plumose spines on the trochanter of the palp and of long plumose and simple acuminate spines on the first leg. Inner side of coxa, trochanter, and femur of first leg and outer side of the corresponding segments of the palp clothed with simple hairs and bristles.

*Measurements in millimetres*.—Total length 55; length of carapace 24, from fovea to anterior edge 17; width 21; length of first leg 65, second 60, third 57, fourth 69; patella + tibia of first 24, of fourth 23; protarsus of fourth 19.

*Loc.* Lesser Antilles: St. Lucia (*G. A. Ramage* and *Miss Alexander*); Point Michel, in Dominica (*G. A. Ramage*).

This species has a higher narrower head than the South-American species of the genus with which I am acquainted. In the length of its legs it resembles *A. geniculata*.

It is, perhaps, to this species that must be referred the specimen from St. Vincent, and possibly the one from Mar-



tinique, which Walckenaer referred, though no doubt erroneously, to *Mygate Blondii*, a species hitherto known only with certainty from Cayenne (Ins. Apt. i. p. 210, 1837).

*Acanthoscurria tarda*, sp. n.

♀.—Nearly allied to *A. Brocklehursti*, F. Cambridge (P. Z. S. 1896, p. 739, pl. xxxiv. fig. 18), from Para, but differing in the characters pointed out in the diagnosis as well as in having shorter legs, and the white stripes at the ends of the leg-segments less distinct.

*Carapace* as long as patella and tibia +  $\frac{1}{4}$  the protarsus of the fourth leg and as protarsus and tarsus of that leg, and considerably longer than patella and tibia of first leg.

*Eyes* of anterior line widely separated, the medians larger than the laterals, separated by a space exceeding their diameter and by about a diameter from the laterals; posterior medians much closer to the posterior laterals than to the anterior medians; space between the two laterals almost or quite equal to the long diameter of the anterior lateral.

*Measurements in millimetres*.—Total length 62; length of carapace 26, width 23; length from fovea to anterior border 19; length of first leg 63, second 58, third 55, fourth 66·5; patella+tibia of first 23·5, of fourth 21·5; protarsus of fourth 17·3.

*Loc.* Rio Teffe, on the Amazons (*Dr. Bach*).

*A. ferina*, Simon (Ann. Soc. Ent. Fr. 1892, p. 282), is based upon a male specimen also from Teffe; but the difference in size and situation of the eyes between that specimen and the type of *A. tarda* is too great to permit one to suppose that they are sexes of the same species. According to Simon, the eyes of the anterior line are large, subequal, and narrowly separated, the posterior medians are narrowly separated from the anterior medians, and the two laterals are very narrowly separated from each other.

*Acanthoscurria suina*, sp. n.

♀.—*Colour*. Hairy clothing a tolerably uniform yellow-brown, the legs indistinctly banded longitudinally and with narrow pale transverse bands at the distal ends of the segments.

*Carapace* longer than patella and tibia of first or fourth, as long as protarsus and tarsus of fourth leg, almost as long as the three distal palpal segments, almost as long as femur and patella of fourth leg, but scarcely exceeding femur and half the patella of first, distance from fovea to anterior border exceeding patella and tibia of palp and protarsus of fourth leg;

cephalic region high and narrow, as in *A. antillensis*; eyes of anterior line subequal, subequally spaced, the medians barely a diameter apart, posterior medians nearer to the laterals than to the anterior medians, the two laterals separated by a space which is equal to the long diameter of the posterior laterals.

*Legs* 4, 1, 2, 3, fourth exceeding first by about one fourth the length of its tarsus, fourth a little more than two and a half times the length of the carapace, third a little more than twice the length. Stridulating-organ consisting of twenty or more rather slender and short plumose bristles, with a few longer spines intermixed on the trochanter of the first leg and about the same number of short plumose bristles on the trochanter of the palp. No other plumose hairs on these appendages.

*Measurements in millimetres*.—Total length 39; length of carapace 19, width 16.5; length from fovea to anterior border 13; length of first leg 47, second 41, third 38, fourth 48.3; patella and tibia of first 18, of fourth 16; protarsus of fourth 14.5.

*Loc.* Uruguay.

*Acanthoscurria sternalis*, sp. n.

♀.—Prevailing colour a tolerably uniform mouse-brown; abdomen more velvety black above and below, clothed above with long reddish bristles.

*Carapace* as long as patella + tibia of first leg, very slightly longer than those of fourth, as long as protarsus +  $\frac{1}{2}$  tarsus of fourth, slightly longer than tibia + protarsus of second, as long as femur +  $\frac{1}{2}$  patella of first and as femur +  $\frac{3}{4}$  patella of fourth.

*Eyes* of anterior line subequal, subequally spaced, distance between medians rather less than their diameter; the posterior medians nearer to the posterior laterals than to the anterior medians; distance between the two laterals on each side slightly less than long diameter of posterior lateral.

*Legs* 4, 1, 2, 3, fourth exceeding first by more than half its tarsus; fourth nearly three times the length of the carapace, first more than two and a half times its length.

*Palp* with femur posteriorly without plumose bristles, those on the trochanter stout, curved, plumose, and up to about twenty in number; a few slender plumose bristles on the adjacent area of the coxa inferiorly. Femur of first leg with thickish plumose scopula in its basal half, the plumose hairs becoming more and more scanty distally; a small pad of plumose hairs on the distal third of the coxa in front below

the groove and proximally passing into stout spines; on the anterior side of the trochanter there are a few longish spines and some thinner plumose bristles.

*Sternum* very convex, both longitudinally and transversely, the middle of its surface projecting considerably below the level of the lower side of the coxæ.

*Measurements in millimetres*.—Total length 38; carapace 17.5; first leg 47, second 42, third 39, fourth 51; patella + tibia of first 17.5, of fourth 17; protarsus + tarsus of fourth 21, of first 16.

*Loc.* Tucuman, 450 m. in the Argentine.

This species differs from all known to me in the strong and extraordinary convexity of its sternum. Apart from this feature it would fall alongside *A. Brocklehursti* in the sub-joined table, but differs in other respects from that species.

The females of the species of the genus known to me may be diagnosed as follows:—

- a. Sternum quite flat, higher than inferior surface of coxæ.
  - a<sup>1</sup>. Patella, tibia, and protarsus of legs with broad pale distal band; anterior side of femur of first leg and posterior side of femur of palp with feathery scopula extending nearly to distal end of segment .. *geniculata*, C. K.
  - b<sup>1</sup>. Patella, tibia, and protarsus of legs with at most a narrow distal band; anterior side of femur of first leg and posterior side of femur of palp without feathery scopula or scopulate only at base.
  - a<sup>2</sup>. Anterior side of first leg studded at base with plumose hairs in addition to those constituting the stridulating-apparatus.
  - a<sup>3</sup>. No plumose bristles on posterior side of coxa and femur of palp; anterior median eyes less than a diameter from each other and from the laterals; legs longer ..... *Brocklehursti*, F. Cb.
  - b<sup>3</sup>. Some plumose bristles present upon the posterior side of the coxa and femur of palp; anterior median eyes more than a diameter from each other and from the laterals; legs shorter ..... *tarda*, sp. n.
  - b<sup>2</sup>. Anterior side of first leg without plumose hairs, apart from those forming the stridulating-organ.
    - a<sup>4</sup>. Legs longer, fourth about three times as long as carapace, which is only as long as its femur and half the patella, &c... *antillensis*, sp. n.
    - b<sup>4</sup>. Legs shorter, fourth about two and a

- half times the length of the carapace,  
 which is almost equal to its femur and  
 patella ..... *suina*, sp. n.  
*b.* Sternum strongly convex, projecting mesially  
 below the inferior surface of the coxæ..... *sternalis*, sp. n.

### Genus PHORMICTOPUS, Poc.

*Phormictopus*, Ann. & Mag. Nat. Hist. (7) viii. p. 545 (1901).

The name and synonymy of the type of this genus is, I believe, as follows:—

#### *Phormictopus cancerides* (Latr.).

*Mygale cancerides*, Latr. Gen. Crust. et Ins. i. p. 83 (1806).

*Mygale Erichsonii*, C. L. Koch, Die Arach. ix. p. 28, fig. 709 (1842);  
 id. Uebersicht &c. v. p. 72 (1850) (*Lasiodora*).

*Crypsidromus intermedius*, Auss. Verh. z.-b. Wien, xxv. p. 180 (1875).

*Hab.* San Domingo (Haiti).

The British Museum has adult males and females ticketed "Haiti" and "Port au Prince, Haiti." Probably to this species is to be assigned the specimen from San Domingo referred to *Mygale Blondii* by Hahn (Monogr. Spinnen, i. p. 1, 1820). Under the name *Schizopelma Erichsonii*, Banks (Proc. U.S. Nat. Mus. xxiv. p. 218, 1901) has recently recorded a species from Porto Rico which he identifies with *Mygale Erichsonii*, Koch. Since a single tibial apophysis, to mention no other feature, is characteristic of the male of *Schizopelma*, and since the species described as *Mygale Erichsonii* by Koch has a couple of such apophyses, Mr. Banks's determination is certainly erroneous.

The species named *Crypsidromus intermedius* by Ausserer, the type of which is in the British Museum, is based upon immature and mutilated specimens apparently referable to this species.

The genus *Phormictopus* also embraces the form described by Ausserer as *Lasiodora cauta* (Verh. z.-b. Wien, xxv. p. 191, 1875), for which, unfortunately, no locality is as yet known.

The males of the two species that I refer to this genus may be diagnosed as follows:—

- a.* Femur of first leg without plumose hairs on the inner side; femur of third leg not noticeably swollen; protarsus of first strongly convex above, tibia concave; spine of palpal organ smooth along its convex side ..... *cancerides* (Latr.), Poc.



- b. Femur of first leg with plumose hairs internally, of the third leg noticeably swollen; protarsus and tibia of first straight; spine of palpal organ serrulate along its convex side. . . . . *cautus*, Auss.

Genus PAMPHOBETEUS, Pocock.

*Pamphobeteus*, Pocock, Ann. & Mag. Nat. Hist. (7) viii. p. 545 (1901).

*Pamphobeteus antinous*, sp. n.

Colour blackish, the integument thickly covered with short olive-black hairs, showing a characteristic tufted or woolly appearance; upperside of femora of legs with bright steel-blue lustre; some long foxy-red bristles on the abdomen and legs.

Tibial spurs and protarsus of first leg practically as in *P. nigricolor*; palpal organ differing from that of the previously recorded species in having the spine broad and spatulate and oval in its distal half, where it is broader than at the base, the median crest resembling that of *P. nigricolor*.

*Measurements in millimetres*.—Total length 50; carapace 29; first leg 92, second leg 88, third leg 85, fourth leg 104; patella + tibia of first 30, of fourth 32; protarsus of first 21, of fourth 30; femur of first 26, of fourth 27.

*Loc.* Madre de Dios, in Bolivia.

This species is possibly based upon the unknown male of the species from Bogota, described by Ausserer as *Lasiodora ferox*, which also has a woolly clothing. The Museum possesses larger specimens than the type, but unlocalized. One of these gives the following measurements:—Total length 65 millim.; carapace 33; first leg 98, fourth leg 110.

*Pamphobeteus insignis*, sp. n.

♂.—Closely allied to *P. nigricolor*. Prevailing colour of the hairy clothing a deep olive-brown, with a beautiful bluish-purple bloom on the upperside of the body and limbs. Distinguishable from *P. nigricolor* by the form of the palpal organ. In *P. nigricolor* the spine is lightly convex when viewed from one side; when viewed from its concave aspect it is straight and is bordered by sharp crests which converge to the point; in the distal half of this area there arises a median crest, which is high, lies obliquely, and has a distinctly convex edge. In *P. insignis*, on the other hand, the spine is less curved and the median crest is not confined to the distal end of its subspatulate portion, but runs throughout its length.

*Measurements in millimetres.*—Total length 48; carapace 26; first leg 81, second leg 78, third leg 76, fourth leg 93; patella+tibia of first 28, of fourth 30; protarsus of first 18, of fourth 26; femur of first and of fourth 24.

*Loc.* Cauca (*I. da Costa* (type) and *M. Goudot*).

*Pamphobeteus ornatus*, sp. n.

♂.—Closely related to *P. nigricolor* and *insignis*, but with a pinky-red bloom on the upperside. Structurally the protarsus of the first leg is more arcuate, its upperside being evenly though lightly convex, and the lower tibial spur is more on a level with the upper, so that when viewed from the inside no "daylight" is visible between them. The spine of the palpal organ is considerably shorter, more curved, less spatulate, and not so strongly crested as in either of the other species. Trochanter of palp covered behind with a pad of slender but strongly plumose bristles like feathery down.

*Measurements in millimetres.*—Total length 54; carapace 27; first leg 87, second 83, third 80, fourth 99; patella and tibia of first 29, of fourth 31; protarsus of first 21, of fourth 31; femur of fourth 25.

*Loc.* Rio Dagua in Colombia.

The males of the genus known to me may be diagnosed as follows:—

- a.* Integument covered with close woolly hairs; spine of palpal organ broad and spatulate; (with steel-blue lustre above) ..... *antinous.*
- b.* Integument, at least of legs, not noticeably woolly; spine of palpal organ attenuate.
  - a*<sup>1</sup>. Dorsal surface with rosy-pink bloom; spine of palpal organ less strongly crested; a thick pad of finely feathery or downy hairs on posterior side of the trochanter of the palp ..... *ornatus.*
  - b*<sup>1</sup>. Dorsal surface with bluish-purple bloom; spine of palpal organ strongly crested.
    - a*<sup>2</sup>. Spine more curved, the median crest of its concave (anterior or spatulate) side short, high, convex, and limited to the distal extremity; the long hairs on the posterior side of the trochanter of the palp delicately plumose, but without thick cluster of fine barbed hairs ..... *nigricolor.*
    - b*<sup>2</sup>. Spine straighter, the median crest long, not high, and extending throughout the length of the spine; posterior side of trochanter of palp furnished distally with a cluster of very fine, close-set, delicately barbed hairs ..... *insignis.*

In addition to the type species, *P. nigricolor*, Auss., and the others described above this genus contains those named by Ausserer *Lasiodora fortis* and *ferox*, of which only female examples are known (Verh. z.-b. Wien, 1875, pp. 192-194).

*Lasiodora Augusti* and *L. vespertinum*, Simon, from Los Puentes, near Quito, in Ecuador, no doubt also belong to the genus *Pamphobeteus*. The former, according to Simon, differs from *P. nigricolor*, Auss., in its smaller size, in being tinted with reddish violet, and in having a sinuous palpal spine. *P. vespertinus* is covered with reddish pubescence, and further differs from *P. Augusti* in having the spine of the palpal organ thicker, lightly dilated and lanceolate, and furnished with a higher and obtuse triangularly elevated median spine.

### Genus XENESTHIS, Simon.

#### *Xenesthis monstrosus*, sp. n.

♀.—*Colour*. Hairy clothing of body and limbs deep olive-black and woolly; a pair of purplish-red patches on the head, but otherwise without red pubescence.

*Measurements in millimetres*.—Total length 74; carapace 32; first leg 76, second leg 70, third leg 71, fourth leg 89; patella and tibia of first 28, of fourth 29; protarsus of first 16, of fourth 25.

*Loc.* New Granada.

This species is nearly allied to *X. immanis*, Auss. (= *colombiana*, Sim.), which the British Museum possesses from Bogota in Colombia (Keyserling Coll. and *L. Greening*), and Tachiro in Venezuela (*Mr. Higgins*). The females of the two, however, may be contrasted as follows:—

- a. Legs much longer, the fourth rather more than three times as long as the carapace, the first about twice and two thirds as long; carapace equal to patella and tibia of first or fourth leg, a little longer than protarsus of fourth ..... *immanis*, Auss.
- b. Legs much shorter, the fourth considerably less than three times, the first less than twice and a half as long as the carapace; carapace distinctly exceeding patella and tibia of first or fourth, as long as the fourth protarsus+more than half the tarsus .. *monstrosus*, Poc.

The type of *X. immanis*, Auss. (♀), gives the following measurements for comparison:—

Total length 65 millim.; carapace 29; first leg 80, second

leg 74, third leg 73, fourth leg 92; patella + tibia of first 28.5, of fourth 28; protarsus of first 16, of fourth 27.

Besides the type the British Museum has two additional females of *X. immanis*; these resemble the type in relative measurements.

### Genus CYRTOPHOLIS, Sim.

*Cyrtosternum*, Auss. Verh. z.-b. Wien, 1875, p. 176 (nom. præocc.)  
(type *cursor*, Auss.).

*Cyrtopholis*, Simon, Hist. Nat. Araign. i. p. 143 (1892) (type *innocuus* (Auss.), Sim.).

*Lyrosceus*, F. Cambr. Ann. & Mag. Nat. Hist. (7) vii. p. 324 (1901)  
(type *Bonhotei*, F. Cambr.).

Simon proposed *Cyrtopholis* to replace *Cyrtosternum*. He drew the characters of the genus from an unnamed species from St. Thomas and from specimens he identified with *Crypsidromus innocuus*, Auss., a Cuban species. The type of *Cyrtopholis*, then, is the species represented by the specimens referred by Simon to *innocuus*.

The type of *Cyrtosternum*, namely, *cursor*, from San Domingo, was unknown to Simon. As has already been pointed out by myself (Ann. & Mag. Nat. Hist. (6) xvi. p. 226, 1895) and Mr. F. Cambridge (Biol. Centr.-Amer., Araneidea, vol. ii. p. 29, 1897), Ausserer based the genus upon the strong convexity of the sternum, not, as Simon states, upon the curvature of the anterior ocular line. The types of *C. cursor* are in the British Museum and are doubtfully adult females. Apart from the convexity of the sternum, I can find no character with pretensions to be of generic value between this species and the others here referred to *Cyrtopholis*. But to regard this as of generic value complicates the question of names, for it entails the ascription of a new generic name to replace *Cyrtosternum*, since the species from which the characters of *Cyrtopholis* were taken have the sterna flat. That this species is congeneric with the type of *Lyrosceus*, F. Cambr., with which the other Antillean species known to me agree, is very probable. I have acted upon this probability in the generic synonymy given above; but should this supposition prove erroneous the matter may be easily rectified, since the type species to which the three generic names have been given are settled.

### *Cyrtopholis cursor* (Auss.).

*Cyrtosternum cursor*, Auss. Verh. z.-b. Wien, 1875, p. 176.

*Loc.* San Domingo.

The only specimens of this species available for examination



have the tarsal pad of the fourth leg divided by a band of bristles; but since these examples are doubtfully mature, the carapace measuring only 13 millim. in length, these characters cannot be relied upon as of any systematic value.

•*Cyrtopholis Bonhotei* (F. Cambr.).

*Lyrosceus Bonhotei*, F. Cambr. Ann. & Mag. Nat. Hist. (7) vii. p. 324, pl. vii. figs. 6, 6 a (1901).

*Loc.* Nassau, in the Bahamas (*J. L. Bonhote*).

*Cyrtopholis venatorius* (Linn.) \*.

*Aranea venatoria*, Linn. Syst. Nat. ed. 12, p. 1035 (in part.).

*Mygale bartholomæi*, Latreille, Nouv. Annales Mus. i. p. 71 (1802); Walck. Ins. Apt. i. p. 214 (1837).

? *Mygale incana*, C. Koch, Die Arachn. ix. p. 70, fig. 735 (1842).

*Crypsidromus gypsator*, Becker, Ann. Soc. Ent. Belg. xxii. p. 85, pl. ii. fig. 11 (1879).

*Cyrtopholis antillana*, Thorell, Bih. Sv. Vet.-Akad. Handl. xx. pt. iv. no. 4, p. 25 (1894).

? *Cyrtopholis* sp., Simon, Hist. Nat. Araign. i. p. 143 (1892) (in note).

*Loc.* Lesser Antilles.

\* Linnæus based *Aranea venatoria* upon two species—the well-known form which Latreille made the type of his genus *Heteropoda* under the name *venatoria* and the West-Indian Aviculariine *Cyrtopholis*. The latter is indicated in the last of the four references Linnæus cites, the remaining three referring to the species of *Heteropoda*. This overwhelming preponderance of references in favour of *Heteropoda* no doubt influenced Latreille in his determination of the species *venatoria*. Unfortunately Fabricius antedated Latreille, and in 1793 assigned the name *regia* to the species Latreille called *venatoria*, thus by unconscious elimination fixing the name *venatoria* on to the second species included by Linnæus under that name.

Further confusion was created by the action of Fabricius in ascribing the name *venatoria*, whether intentionally or not is no matter, to a species not referred to by Linnæus under *venatoria*. Linnæus included the spider from Antigua described by Browne ('Jamaica,' p. 420) as *Tarantula rufescens major* &c., and represented on pl. xlv. fig. 2, but not the *Tarantula major subhirsuta sub terram nidulans* described on the same page and represented by fig. 3 on the same plate. It was upon this last-named species that Fabricius fixed the name *venatoria*; hence the fixation is without value and is null and void. So far as any action taken by Fabricius in the matter is concerned, the only reason that can be alleged for setting aside Latreille's interpretation of the name *venatoria* is that given above, namely, the previous ascription of the name *regia* to the same species by Fabricius. If this be considered sufficient, then the name *venatoria* falls upon the Antigua Aviculariine belonging to *Cyrtopholis*.

I believe, however, that Linnæus himself was the first to give a second name to the species he first referred to *venatoria*. Immediately following the diagnosis of *venatoria* is that of *Aranea ocellata*, which is almost certainly based upon the male of the species that Fabricius named *regia*. The size, ocelliform spots on the femora, paired patches on the carapace,

The British Museum has specimens that I refer to this species from Montserrat (*Sir A. Alderley*) and Antigua (*C. A. Barber, W. R. Forrest, J. W. Gregory*), and also an immature female ticketed with the MS. name *Crypsidromus alticeps*, Keys., from the last-named island. The type of *gypsator* was also from Antigua. The specimens described by Latreille and Thorell were from St. Bartholomew, the species named *incana* by C. Koch, and the one mentioned but not described by Simon, from St. Thomas. In Browne's 'History of Jamaica,' p. 420, pl. xlv. fig. 2, this species is figured and briefly described as a native of Antigua. This figure formed part of the basis of the species named *Aranea venatoria* by Linnaeus.

*Cyrtopholis femoralis*, sp. n.

♂.—Much smaller than *C. Bonhotei* and *C. venatorius*. Integument deep castaneous, covered with yellowish-brown hairs, with long pale bristles on the abdomen.

*Carapace* as in *C. venatorius*; eyes also almost as in that species, those of the anterior line slightly procurved, laterals a little larger than medians, medians barely a radius apart.

In spine-armature of *legs* and proportion of leg-segments closely resembling *C. venatorius*, except that the femur of the third is considerably more thickened relatively, the width being considerably more than one third the length of its

and the locality (China) all fit the male of *regia*, though the phrase "black ring on the abdomen" is puzzling.

The earlier synonymy of the species involved is, I believe, as follows:—

1. *Cyrtopholis venatorius* (Linn.).

*Aranea venatoria*, Linn. Syst. Nat. ed. 12, p. 1035. no. 34 (1766) (in part., i. e., refs. to Browne's 'Jamaica,' p. 420, pl. xlv. fig. 2).

2. *Heteropoda ocellata* (Linn.).

*Aranea venatoria*, Linn. Syst. Nat. ed. 12, p. 1035. no. 33 (in part., i. e., refs. to Gronovius, Sloan, and Merian).

*Aranea ocellata*, Linn. ibid. no. 34 (♂).

*Aranea regia*, Fabr. Ent. Syst. ii. p. 408 (1793) (♀).

*Heteropoda venatoria*, Latreille, Thorell, et alii (olim).

*Heteropoda regia*, Fabr., L. Koch, Simon, &c.

3. *Pachylomerus nidulans* (Fabr.).

*Aranea venatoria*, Fabr. Syst. Ent. p. 439 (1775) (nec *venatoria*, Linn.).

*Aranea nidulans*, Fabr. Mant. Ins. i. p. 343 (1787).

*Aranea venatoria*, Fabr. Ent. Syst. ii. p. 408 (1793).

upperside (3:7·8); the protarsal scopulæ are more scanty and the tarsal scopulæ of the third and fourth legs divided by a narrow band of bristles. *Palpal organ* constructed practically as in *C. venatorius*. Protarsus of first leg straight, not arcuate.

*Stridulating-organ* practically as in *C. venatorius*.

*Measurements in millimetres*.—Total length 21; length of carapace 10, width 2; length of first leg 33, second leg 31, third leg 29, fourth leg 36; patella and tibia of first and fourth 12·5; protarsus of fourth 11.

*Loc.* Montserrat (*Sir A. Alderley*).

A smaller species than *C. venatorius*, presenting many features of the young of the latter, in conformity with the well-known biological law.

### *Cyrtopholis agilis*, sp. n.

♂.—About the same size as *C. femoralis*. Integument covered with brown hairs with a golden lustre.

*Carapace* considerably shorter than patella and tibia of first or of fourth legs and distinctly shorter than protarsus of fourth; cephalic region moderately high; eyes of anterior line more widely spaced than in *C. femoralis*, the medians about a diameter from each other, but rather less than that from the laterals.

*Legs* 4, 1, 2, 3; tibia of first armed with about five spines, two inner and three outer, one of the latter being apical; the spurs stout, bluntly rounded, the inferior expanded at the distal end; protarsus lightly arcuate, unspined (?except at apex); tibia of second with eight spines; protarsus with one external spine at base of scopula, which does not reach base of segment; third and fourth legs more numerous spined; femur of third scarcely incrassate; tarsal scopula of fourth incompletely divided by a band of setæ.

*Palp* with two internal tibial spines; palpal organ with the spine more filiform than that of *C. Bonhottei*.

*Stridulating-organ* consisting of about nine clavate plumose bristles on the trochanter of the first leg and about three similar bristles on the trochanter of the palpus.

*Measurements in millimetres*.—Total length 18; carapace 9·5; width of carapace 8; length of first leg 34, second 32, third 29, fourth 37; patella and tibia of first and fourth 12; protarsus of fourth 10·5.

*Loc.* San Domingo.

To the genus *Cyrtopholis* I also refer the following species:—

*Cyrtopholis pernix*, Auss. Verh. z.-b. Wien, 1875, p. 178 (*Crypsidromus*); F. Cambridge, Biol. Centr.-Amer., Araneidea, ii. p. 31, pl. ii. fig. 14 (1897) (*Hapalopus*).

Loc. Pic d'Orizaba, Mexico.

The following is a key to the species known to me, the characters being mostly taken from specimens of the male sex:—

- a. Sternum strongly convex ..... *cursor*, Auss.
- b. Sternum flat.
  - a<sup>1</sup>. Eyes of anterior line only a little procurved, nearly straight by their centres; stridulating-bristles on first leg spatulate (*i. e.*, expanded and compressed), those on palp few and not plumose; spine of palpal organ with strong keel. .... *pernix*, Auss.
  - b<sup>1</sup>. Eyes of anterior line more strongly procurved, stridulating-organ consisting of lightly clavate plumose bristles on first leg and palp; spine of palpal organ without strong keel.
    - a<sup>2</sup>. Small, carapace up to 11 mm. long.
      - a<sup>3</sup>. Femur of third leg scarcely swollen, inferior tibial spur distally incrassate and rounded ..... *agilis*, sp. n.
      - b<sup>3</sup>. Femur of third leg much swollen, inferior tibial spur distally narrowed ..... *femoralis*, sp. n.
    - b<sup>2</sup>. Large; carapace not less than 16 mm. long.
      - a<sup>4</sup>. Colour a tolerably uniform brown, with golden lustre; legs with pale bands; spine of palpal organ strongly compressed .... *venatorius*, Linn.
      - b<sup>4</sup>. Colour mostly black; carapace thickly coated with golden-grey hairs; spine of palpal organ not compressed ..... *Bonhotei*, F. Cb.

### Genus CITHAROSCELUS, Pocock.

*Citharoscelus*, Pocock, Ann. & Mag. Nat. Hist. (7) iii. p. 347 (1899).  
 ? *Grammostola* + *Homœomma*, Simon, Hist. Nat. Araign. i. pp. 162, 163 (1892).

This genus contains the following species:—

#### *Citharoscelus spatulatus* (F. Cambridge).

- ? *Mygale rosea*, Walck. Ins. Apt. i. p. 213 (1837); Guérin, Voy. 'Favorite,' v. pt. 2, p. 165, pl. xlvi. fig. 1 (1839) (*nec roseus*, Simon).
- ? *Mygale rosea*, C. Koch, Die Arachn. ix. p. 59 (1842).
- ? *Mygale rubiginosa*, Nicolet in Gay's Hist. de Chile, Zool. iii. p. 330 (1849).



*Eurypelma spatulatum*, F. Cambridge, Biol. Centr.-Amer., Araneidea, ii. p. 24, pl. i. figs. 19, 19 *a*, *b* (1897).

*Citharoscelus Kochii*, Pocock, Ann. & Mag. Nat. Hist. (7) iii. p. 348 (1899); F. Cambridge, Journ. Linn. Soc., Zool. xxvii. p. 16, pl. ii. figs. 13-15 (1899); Pocock, Fitzgerald's Highest Andes, p. 359 (1899).

*Loc.* Chili: Valparaiso, Santiago, Coquimbo.

This species, whatever its true name may be (for a discussion of which see *infra*, p. 105), is one of the commonest Chilean species of Aviculariidae.

The locality "Mexico" assigned to the type of *Eurypelma spatulatum* is no doubt an error. The specimen upon which this species was based formed part of the late Count Keyserling's collection. This collection also contained an example of *Paraphysa manicata*, another common Chilean species, ticketed Mexico.

*Citharoscelus Gossei*, Pocock.

*Citharoscelus Gossei*, Pocock, Fitzgerald's Highest Andes, p. 359, figs. 2-2 *a*, *b* (1899).

*Loc.* Argentine Republic: Lujan.

*Citharoscelus mollicomus* (Auss.).

*Eurypelma mollicomum*, Ausserer, Verh. z.-b. Wien, xxv. p. 198 (1876).

The stridulating-organ consists of a thick cluster of slender bristles, forming a subquadrate pad upon the distal third of the posterior side of the coxa of the palp, and a cluster of similar bristles above and below the suture at the distal end of the coxa of the first leg.

In addition to the type specimen from Uruguay, the British Museum has examples (♂, ♀) taken between Porto Alégre and Uruguana in Rio Grande do Sul (*J. Blakesley*).

*Citharoscelus Jheringii* (Keyserling).

*Eurypelma Jheringii*, Keyserling, Brasilianische Spinnen, p. 19, pl. i. fig. 4 (1891).

*Loc.* Taquara, Rio Grande do Sul (*H. von Jhering*).

*Citharoscelus actæon*, sp. n.

♂.—*Colour*. Integument of carapace and mandibles blackish, clothed, like the legs, with short golden-brown hairs; legs thickly clothed with reddish-brown bristles; numerous

fiery-red bristles on upperside of abdomen; coxæ, sternum, and lower side of abdomen black.

*Carapace* about as wide as long, as long as patella and tibia of fourth leg, a little shorter than those of second, and barely exceeding protarsus and tarsus of first; fovea deep, a little recurved; ocular tubercle high, nearly round.

*Eyes* small, those of anterior line procurved, subequal and subequally spaced, medians about two diameters apart, posterior lateral eyes larger than the rest.

*Legs* 4 and 1, 2, 3; patella and tibia of first almost as long as protarsus and tarsus of first; protarsal scopula of first covering more than half the segment, of third about half, of fourth nearly one third of the segment; legs weakly spined, except the protarsi of third and fourth, one spine at the base of the protarsus on the first and second; tibiæ almost unspined. Protarsus of first leg lightly bowed. Upper tibial spur of first leg rounded at apex, with one or two spines lying along its underside; lower spur strong, directed vertically downwards, then curving forwards at the tip, which is armed above with a short spine, there is also a spine on its outer side.

*Palpal organ* piriform, the spine attenuate, pointed, with slight spiral curvature and strong external crest.

*Stridulating-organ* consisting of very many simple incrasate but apically attenuate bristles, those on the coxa of the first leg being situated below the suture.

*Measurements in millimetres*.—Total length 58; carapace 31; first leg 94, second leg 87, third leg 76, fourth leg 95; patella and tibia of first 36, of fourth 31; protarsus of fourth 25.

*Loc.* Brazil (*Mornay*). A single adult male.

*Citharoscelus alticeps*, sp. n.

♂.—*Colour*. A blackish-grey clothing of short hairs covering the body and limbs; the margin of the carapace, the abdomen, and limbs covered in addition with reddish-grey setæ; pale lines conspicuous on the patella, but not so noticeable on the other segments.

*Carapace* noticeably longer than wide, its length a shade less than that of the fourth protarsus, the width considerably less than the patella and tibia of the third leg, and less than the distance between the posterior border of the carapace and the ocular tubercle; fovea deep and wide, grooves strong.

*Head* very high and convex, rather wide in front; tubercle low, distinctly wider than long. *Eyes* of the anterior row

strongly procurved, the anterior edge of the medians being a little behind the centre of the laterals, nearly evenly spaced and a little unequal in size, the medians being the larger and separated from each other by a space which equals their diameter; posterior medians much smaller than the anterior medians, but not very widely separated from them, closer to the posterior laterals, which are about as large as the anterior laterals, and separated from them by a space which is quite equal to the long diameter of the latter\*.

*Legs* long and slender, 1 and 4, 2, 3; tarsi of fourth longer than of first, patella and tibia of first considerably longer than of fourth: *protarsal scopula* of first covering three-quarters of the segment, with a pair of long spines at its base; that of the second covering two thirds, with three to five long spines at its base; that of the third covering half the segment, with many basal spines; that of the fourth covering about one fifth of the segment, which is elsewhere strongly spined: *tibiæ* of all the legs and of the palpus spined; an anterior spine on the patella of first and second legs.

Spurs on the first *tibia* well developed, the upper stout, straight, cylindrical, blunt, and bearing a long sinuous spine on its underside, the lower crescentically cylindrical, curved, with a stout spine on its apex; the *protarsus* distinctly but slightly bowed at its proximal end.

The *palpal organ* piriform, terminating in a delicate hair-like process; at the base of the narrower portion the organ offers a spiral twist; there are externally two keels, the lower of which is very conspicuous.

*Stridulating-organ* consisting of a large cluster of fine close-set bristles clothing the distal third of the posterior surface of the coxa of the palp, and of two smaller clusters of similar close-set bristles at the distal end of the anterior surface of the coxa of the first leg, one just above and the other just below the suture.

♀ (not quite mature).—*Carapace* like that of the male, but a little wider in proportion to its length, especially the cephalic region, mandibles wider at the base; length of carapace equal to that of patella and tibia of fourth leg and exceeding the protarsus, its width exceeding the patella and tibia of the third leg. *Eyes* as in the male described.

\* One male example from the same bottle, and unmistakably belonging to the same species, which has been dried, has the anterior median eyes much smaller, being smaller than the anterior lateral and separated by a space which considerably exceeds a diameter. This circumstance shows how very careful one should be in the use of ocular characters for the distinction of genera and species.

*Legs 4, 1, 2, 3*, the fourth exceeding the first by about half the length of its tarsus; protarsal scopulæ a little shorter on all the legs; patella and tibia of first and fourth about equal.

*Measurements in millimetres.*—♂. Total length 37; length of carapace 17, width 14.5; length of first leg 62, second 57, third 53, fourth 63.5; patella and tibia of first 22, of fourth 20; protarsus of fourth 17.

♀. Total length 30; carapace 15; first leg 41, second leg 38, third leg 36, fourth leg 45.

*Loc.* Uruguay; without further history.

Key to the foregoing species:—

- a.* Stridulating-bristles few in number, large and red distally ..... *spatulatus*, F. Cb.
- b.* Stridulating-bristles numerous and close-set, those on the posterior side of the coxa of the palp forming a large quadrate area on its distal third.
  - a*<sup>1</sup>. Protarsus of first leg scopulate almost to base; ocular tubercle very high ..... *mollicornus*, Auss.
  - b*<sup>1</sup>. Scopula on first protarsus not nearly extending to its base; ocular tubercle normal.
    - a*<sup>2</sup>. Protarsus of first leg (in male) strongly arcuate; some short stout spines on the posterior side of the coxa of the palp beneath the stridulating-bristles ..... *Gosseii*, Poc.
    - b*<sup>2</sup>. Protarsus of first leg (in male) less arcuate; no spines beneath the stridulating-bristles on the coxa of the palp.
      - a*<sup>3</sup>. Carapace as long as protarsus of fourth leg ..... *alticeps*, sp. n.
      - b*<sup>3</sup>. Carapace longer than protarsus of fourth leg.
        - a*<sup>4</sup>. Carapace longer than wide; protarsal scopula of first leg covering less than half the lower side of the segment; a thick cluster of stridulating-bristles above the suture on the coxa of the first leg ..... *Jheringii*, Keys.
        - b*<sup>4</sup>. Carapace as wide as long; protarsal scopula of first leg covering more than half the lower side of the segment; only a few bristles above the suture on the coxa of the first leg ..... *actæon*, sp. n.

### Genus BRACHYPELMA, Sim., emend.

*Brachypelma*, Simon, Hist. Nat. Araign. i. p. 168 (1892).

A scopula of plumose hairs upon the anterior side of the trochanter of the first leg and on the inner side of its femur, at least in the females; also upon the posterior side of the



trochanter of the palp. Coxa of first leg clothed anteriorly with long hairs, many (? all) of which have thickened spiniform bases.

Type *B. æmilia* (White).

Also contains *Brachypelma vagans* (Auss.), *B. albiceps*, nov.\* (♀ nec ♂), *B. Smithii* (F. Cambr.), and others from Mexico.

*Distribution.* Central America.

### Genus SPHÆROBOTHRIA, Karsch.

In *Sphærobothria* (male) the femur, trochanter, and adjacent area of the coxa of the first leg and the corresponding areas on the posterior side of the coxa and trochanter of the palp are scopulate.

In the female the scopulate hairs on the first leg are much less richly developed.

Type (and only known species) *S. Hoffmanni*, Karsch.

*Distribution.* Guatemala, &c.

### Genus PARAPHYSA, Simon.

*Paraphysa*, Simon, Hist. Nat. Araign. i. p. 166 (1892).

Specimens that I refer to *Paraphysa manicata*—a species which is abundant in Chili—have the anterior side of the coxa, trochanter, and base of femur of first leg uniformly clothed with long bristles, similar in form and subequal in length. Similar bristles are present upon the posterior side of the trochanter of the palp. The character of the genus taken from the small number of labial cusps has little systematic value, the number of cusps varying from seven to over thirty.

Type *P. manicata*, Sim.

### Genus PHRYXOTRICHUS, Simon.

*Phryxotrichus*, Simon, Hist. Nat. Araign. i. p. 163 (1892).

In *P. auratus*, the only species known to me which appears to fall certainly into this genus as diagnosed by Simon, the palp and first leg are clothed with hairs, somewhat similar in form and situation to those of *Paraphysa*; but the bristles on the coxa and trochanter of the first leg are more aciculate.

\* For *B. pallidum*, ♀, from Guerrero, which was doubtfully assigned by Mr. F. Cambridge to the ♂ from Chihuahua.

*Phryxotrichus auratus*, sp. n.

? *Phryxotrichus roseus* (Walck.), Simon, Hist. Nat. Araign. i. p. 169 (1892).

? *Orthotrichus vulpinus*, Karsch, Zeits. ges. Naturwiss. liii. p. 390 (1880).

♀.—*Colour*. Integument black or deep blackish brown and clothed with short black woolly hair; the margin of the carapace, the upper surface and sides of the abdomen, and the legs clothed with bright golden-yellow bristles; a sooty-black tarsal and protarsal stripe; the carapace, sternum, coxæ, and lower side of the abdomen black.

*Carapace* nearly circular, about as broad as long; the length almost equal to that of patella and tibia of fourth or of second leg, considerably less than those of first, less than protarsus and tarsus of fourth, exceeding those of first; head broad and high; ocular tubercle a little wider than long. Eyes small, those of anterior line procurved, subequally spaced, distance between the medians greater than their diameter; anterior laterals a little larger than anterior medians, posterior medians almost as large as anterior medians and smaller than posterior laterals.

*Legs* 1, 4, 2, 3 in length, almost without spines, the tibiæ with at most a pair of inferior apical and the protarsi (except of fourth) with one (on third leg two) at base and one at apex of scopula, the latter being not always visible, the protarsus of fourth armed in addition with four internal and one external spine. Palp with three inferior apical tibial spines; tarsus of fourth as long as of first; claws untoothed; protarsal scopulæ of first and second covering two thirds the lower side of the segment. *Labial teeth* about 6–12 (♀ ♂).

♂.—Like the female in colouring and spine-armature of legs.

*Carapace* as long as patella and tibia of third leg, a little longer than tibia of first, shorter than tibia and protarsus of first or fourth.

*Legs* 1, 4, 2, 3; tarsus of fourth slightly shorter than that of first, protarsal scopulæ of first and fourth covering about one half the segment.

*Tibial spurs* of first leg small, the upper cylindrical, unarmed; the lower directed nearly vertically downwards and inwards, relatively straight but bent quite at the apex, where it is tipped with a single long spine.

*Palpal organ* with bulb piriform and spine attenuate, apically pointed, with slight spiral twist and spirally crested.

*Measurements in millimetres*.—♀. Total length 33; cara-

pace 16; first leg 47, second leg 43, third leg 40, fourth leg 46.

♂ (type). Total length 35; carapace 19; first leg 67, second leg 58, third leg 53, fourth leg 61.

Loc. Chili: Santiago (*G. A. J. Rothney*, type, ♂); Valdivia (♀).

According to Simon (*Hist. Nat. Araign.* i. p. 169), *Phryxotrichus* is represented by a single species, *P. roseus*, Walck., of which *rubiginosus*, Nic., and *vulpinus*, Karsch, are synonyms; he adds, moreover, that the species is very common in Chili. Judging by the Chilian material preserved in the British Museum, the commonest species of Aviculariidae in that country is the form to which I have given the name *Citharoscelus Kochii*, on the supposition that it may be the same as the species identified by C. Koch as *Mygale rosea*, Walck. Now *Citharoscelus Kochii*, although abundant in Chili and of a beautiful pinky-red hue with silky lustre, well deserving the epithet *rosea*, does not present the characters of the genus *Phryxotrichus*, and therefore cannot be the *roseus* of Walckenaer, if we are to accept Simon's determination of the latter species. Unfortunately, Simon does not give reasons to support his determination of *rosea*, Walck. The diagnosis of *rosea* is plainly inadequate; nevertheless it states that the abdomen and carapace are covered with hairs of a delicate red with rosy lustre—a statement applicable in all particulars to the male of *Citharoscelus Kochii*. Walckenaer speaks, moreover, of the similarity in colour between the carapace and abdomen as distinctive of *rosea* as compared with his *versicolor*.

Now, since the specimens here described as *P. auratus* are in no sense of the word "rosy red" and have the carapace and abdomen dissimilarly coloured, I find it impossible to refer them to *roseus* of Walckenaer, although it is highly possible, perhaps probable, that they may prove to be specifically identical with the specimens identified by Simon as *roseus*—the specimens, in fact, from which the characters of *Phryxotrichus* were taken. Two considerations, however, militate against this view—namely, that in the female of *P. auratus* the fourth leg is shorter than the first, the tarsi of the two being equal, whereas in Simon's *P. roseus* the fourth leg is longer than the first, but has a shorter tarsus.

In many respects the very inadequate description of *Orthotrichus vulpinus*, Karsch, based on a spider from Valparaiso (*Zeits. ges. Nat.* liii. p. 390, 1880), applies to the example of *P. auratus*; but the phrase "tibia iii. deutlich bestachelt" forbids the identification of the two, although I confess to a

strong suspicion that Dr. Karsch may have made an error in the particular named \*.

\* Since writing these comments I have received from M. Simon his report upon the Arachnida of the 'Hamburger Magalhaensische Sammelreise,' Hamburg, 1902. On p. 5 of this work two species of Aviculariinae are enumerated under the names *Phryxotrichus chilensis*, Mol., and *Citharoscelus Kochii*, Poc.

As synonyms of the first are quoted *Mygale rosea*, Guér., *M. rosea*, C. Koch, ad part., ? *M. rubiginosa*, Nic., ? *Orthotrichus vulpinus*, Karsch, and *Phryxotrichus roseus*, Sim. Of the second, ? *M. chilensis*, Mol. (pars), ? *M. rosea*, Walck., C. Koch (saltem ad part.), *Mygale rosea*, Nic.

The following criticisms must be offered to this suggested synonymy:—

The species, whatever be its identity, that was described by Molina was named in the first instance *Mygale scrofa* (Sagg. Stor. Nat. Chili, 1782, pp. 214–215 & 347). In a later edition of the same work this name was changed to *chilensis* (op. cit. ed. 2, p. 185, 1810). But whether *M. scrofa* is assignable to *Phryxotrichus*, *Paraphysa*, or *Citharoscelus*, or to some other genus, no word in the diagnosis clearly indicates. The use of the words "bruno velutato" and "fusco," as applied to the colour, points to a brown species like *Paraphysa manicata*, rather than to a pinkish-rosy form such as the *Mygale rosea* of Walckenaer, Guérin, and Koch. Again, the synonymy given by Simon suggests that *M. rosea*, Walck., and *M. rosea*, Guérin, were based upon species belonging to different genera, whereas Guérin's words leave no doubt whatever that the two authors described the same *specimen*. Nor does there appear to be any reason to think that Walckenaer and Koch had more than one specimen before them, and thus confounded more than one species under the name "*rosea*," as is suggested by Simon's insertion of the words "saltem ad part."

Comparing the figures and descriptions of *M. rosea*, given by Walckenaer, Guérin, and Koch, one can hardly help believing that these authors had examples of one and the same species in their hands; and I should have unhesitatingly adopted the name *rosea*, Walck., for the type species of the genus *Citharoscelus*, had it not been for Simon's citation as type of the genus *Phryxotrichus*, *M. rosea*, Walck., which he presumably knew, assigning to the latter characters not possessed by the type of *Citharoscelus*. However that may be, it is quite evident that the correct names of the three commonest species of "*Mygale*" inhabiting the best-known localities in Chili, namely the species I have described as *Citharoscelus Kochii*, *Phryxotrichus auratus*, and the one I determine as *Paraphysa manicata*, are still wrapped in obscurity.

To avoid future confusion, it may be well to point out that the type of *Phryxotrichus* should be the species represented by the specimen Simon determined as *Orthotrichus vulpinus* of Karsch, when he proposed *Phryxotrichus* to replace the preoccupied generic name given by Karsch (Ann. Soc. Ent. Fr. 1888, p. 222). Simon himself now admits the uncertainty of his determination. Should the two species prove to be generically, as well as specifically, separable, a second name must be substituted for *Orthotrichus*. Further, Simon subsequently cited *M. roseus*, Walck., as the type of *Phryxotrichus* (Hist. Nat. Araign. i. p. 163, 1892), evidently supposing *vulpinus* and *roseus* to be synonyms. It appears now, from his latest contribution to the synonymy, that he is doubtful even about the *generic* identity of the two.

I have discussed this question at some length because it furnishes an admirable instance of the confusion that may arise from guessing at the identity of another author's species. Far better propose a new specific name than wrongly determine and describe a previously established form.



*Phryxotrichus parvulus*, sp. n.

*Colour.* Carapace black, clothed with long silky hairs; legs covered with greyish-yellow hairs; coxæ and sternum reddish brown; lower side of abdomen black.

*Carapace* longer than wide, its length less than that of patella and tibia of first or of fourth leg, equal to those of second. Ocular area much more compact than in *P. auratus*, about twice as wide as long, medians about a diameter apart, rather less from the laterals, which are larger and half their diameter from the posterior laterals; posterior medians a little smaller than posterior laterals.

*Labium* bearing about 20 teeth.

*Legs* 4, 1, 2, 3 in length; tibia and protarsi of third and fourth and tibia of first and second armed with many strong spines; femora also with a few spines; protarsi of first and second with an apical spine beneath, that of the second with one spine at base as well; protarsal scopulæ of first and second covering distal half of segment, protarsal scopula of fourth completely apical; protarsus of first and, in a less degree, of second arcuate; tibial spurs of first leg strong, the lower stout, directed obliquely forwards and downwards, and armed apically with two strong short spines one above the other, the upper spur armed beneath with a strong spine running along its lower side; on the outer side of the tibia at the apex above the base of the lower spur there are three long spines set close together.

*Palp* with tibia armed with a few spiniform setæ; palpal organ piriform, with a slender attenuate curved spine.

*Measurements in millimetres.*—Total length 17; carapace 8·5; first leg 24, second leg 23, third leg 20, fourth leg 28.

*Loc.* Chili: Valparaiso (*Colonel Hayes Sadler*, type).

Except for the small number of labial teeth the two species here referred to *Phryxotrichus* have little in common.

The two may be compared in the male sex as follows:—

- a. Carapace nearly circular, up to 19 millim. long; fourth leg much shorter than first (60:70 millim.); with the exception of numerous spines on the protarsus of the fourth, and a spine or two at the apex of the tibia and on protarsus of first, second, and third, the legs and palpi are unarmed; lower tibial spur directed vertically downwards and tipped with a long forwardly-directed spine, upper spur unarmed ..... *auratus*.
- b. Carapace longer than wide, 8·5 millim. long; fourth leg much longer than first (28:24 millim.); legs strongly spined, with exception of protarsus of first and second which have a few spines only; lower tibial spur stout, directed obliquely forwards and armed with two short spines, the upper spur with one spine ..... *parvulus*.

## Genus PTERINOPELMA, Pocock.

*Pterinopelma*, Pocock, Ann. & Mag. Nat. Hist. (7) viii. p. 551 (1901).

*Pterinopelma vitiosum* (Keyserling).

*Eurypelma vitiosa*, Keyserling, Brasilianische Spinnen, p. 21, pl. i. fig. 5 (1891).

Loc. Taquara, Rio Grande do Sul (von Jhering).

*Pterinopelma saltator*, sp. n.

♂.—*Colour*. Hairy clothing a uniform dark brown, relieved by foxy-red bristles on the abdomen and legs and narrow pale transverse bands at the extremities of the leg-segments.

*Carapace* considerably longer than wide, cephalic area moderately high; its length less than tibia and half patella of fourth and more than tibia and half patella of first leg, shorter than fourth protarsus, longer than patella, tibia, and tarsus of palp, length from fovea to anterior border scarcely as long as first protarsus; eyes of anterior line subequal, close together, the medians about a radius apart.

*Legs* long, 4, 1, 2, 3, fourth exceeding the first by more than its tarsus; patella and tibia of first less than of fourth, tibia of first not incrassate, armed with two inner spines and five spines on the outer side, of which four are at the distal end; protarsus of first scopulate to base, with two spines projecting from the scopular hairs; protarsus of second scopulate almost to base, with numerous inferior spines; tibia and protarsus of third and fourth with many spines; protarsus of fourth scarcely scopulate apically. Tibia of first not incrassate, its upper spur cylindrical and blunt with inferior spine; lower spur cylindrical, lightly curved; protarsus of first only lightly convex above. Anterior side of coxa and trochanter of first leg clothed thickly with simple hairs; the posterior side of the trochanter of the palp with scopula of plumose hairs.

*Palpi* short, projecting just beyond the patella of the first leg, the tibia armed internally with about nine strong spines; bulb of palpal organ subspherical, the spine strong, blade-like, lightly sinuous, apically pointed.

♀.—Stouter than the male, with very short legs; fourth leg stout, less than three times, first leg less than twice and a half the length of the carapace, third leg about twice the length; carapace longer than broad, longer than patella and tibia of fourth, almost as long as protarsus and tarsus of

fourth; scopula on posterior side of trochanter of palp composed of simple hairs.

*Measurements in millimetres.*—♂ (type). Total length 32; length of carapace 15, width 12; length of head-region 9, palp 21·5, of first leg 48, of second 44, of third 42, of fourth 57·5; patella + tibia of first 16·5, of fourth 18·5; protarsus of fourth 17.

♀. Total length 41; length of carapace 17; width 14; length of head-region 10·8, of first leg 39, of second 35, third 33·5, fourth 47; patella + tibia of first 14, of fourth 16; protarsus of fourth 12.

*Loc.* Uruguay (type, *Keyserling Coll.* and British Museum); Soriano, Uruguay (*T. Havers*).

This species is remarkable for the length of the fourth leg in the male, and for its stoutness in the female; also for having the patella and tibia of the fourth longer than those of the first leg.

*Pterinopelma tigrinum*, sp. n.

♂.—*Colour.* Integument clothed with brownish hairs, with a yellowish hue on the carapace and mandibles, and a darker olive-brown on the upperside of the legs and palp, which are banded with yellowish-white stripes, three being on the femur, two on the patella and tibia, and one at the proximal end of the protarsus; in addition to these pale bands there is a narrow pale fringe at the apex of the patella, tibia, and protarsus.

*Carapace* with head lower than in *Cyrtopholis venatorius*, a little shorter than patella and tibia of first and fourth, a little longer than protarsus of fourth leg. *Eyes* of anterior line more scattered, the medians almost a diameter from each other and quite a diameter from the laterals.

*Legs* 4, 1, 2, 3; tibia of the first with five spines, the spurs a little longer than in *C. venatorius*, the protarsus not bowed, scopulate to base, spined at apex; the second leg with about six tibial spines and two internal proximal and three apical protarsal spines; tibia and protarsus of third and fourth more numerous spined; all the femora spined at apex; femur of third a little thicker than those of the other legs, its upper surface only lightly convex, its sides subparallel.

*Palpus* with tibia armed internally with three distal spines; palpal organ shaped somewhat as in *C. Bonhotei*, but the spine much thicker at the base, and its apex more abruptly narrowed. *Stridulating-organ* consisting of a large number of closely-packed slender plumose bristles covering nearly the whole of the area that bears them.

♀.—Like the male in colour; the carapace higher and legs shorter (*cf.* measurements).

*Measurements in millimetres.*—♂. Total length 30; carapace 16; width of carapace 15; length of first leg 47, second 44·5, third 41, fourth 51; patella and tibia of first 17·5, of fourth 16·5; protarsus of fourth 14·5.

♀. Total length 32; carapace 15; width of carapace 13; length of first leg 40, second 37·5, third 34, fourth 44; patella and tibia of first 15·5; protarsus of fourth 11·5.

*Loc.* Monte Video (*Keyserling Collection*).

### *Synopsis of Species of Pterinopelma.*

- a. Upperside of patellæ and tibiæ with conspicuous pale yellow bands; plumose bristles on anterior side of coxa of first leg relatively coarse ..... *tigrinum*, sp. n.
- b. Upperside of patellæ and tibiæ not conspicuously banded; plumose bristles on anterior side of trochanter of first leg relatively fine.
  - a<sup>1</sup>. Carapace much longer than protarsus of fourth leg, &c. .... *vitiosum*, Keys.
  - b<sup>1</sup>. Carapace a little shorter than the protarsus of fourth leg, &c. .... *saltator*, sp. n.

### Genus HALALOPUS, Auss.

#### *Hapalopus pictus*, sp. n.

*Colour.* Carapace deep brown, thickly clothed with whitish-grey hairs; legs also deep brown with darker femora, also clothed with whitish hairs; abdomen pale, its upperside ornamented with about half a dozen broad black stripes, which cover most of the dorsal middle line and become narrower on the sides of the abdomen.

*Carapace* shorter than patella+tibia of first or of fourth leg, equal to those of second, a little longer than fourth protarsus.

*Fovea* slightly procurved.

*Eyes* of anterior line larger than those of posterior, procurved, subequal and subequally spaced, medians half a diameter apart.

*Legs* 4, 1, 2, 3; tarsal scopula of second, third, and fourth legs divided by a narrow band of setæ, the divisional line very narrow on tarsus of third; protarsus of first and second scopulate in distal half, of third and fourth not scopulate; tibiæ of all legs and protarsi of third and fourth with many spines; protarsus of first with two spines, one interior and one subinferior and median at base of scopula; protarsus of third with five inferior spines, three in a line at base of



scopula, and two at its apex. Tibial spurs of first sub-cylindrical, longish, the lower with a subapical superior spine, the upper with a spine lying along its lower surface. *Palp* with four inner tibial spines; palpal organ with its spines short and very robust, abruptly narrowed and pointed at the tip, with a strong spiral crest.

*Measurements in millimetres.*—Total length 14; carapace 6; first leg 19, second leg 18, third leg 16, fourth leg 21; patella + tibia of first 7·3, of fourth 6·5.

*Loc.* Caras, in Peru (*P. O. Simons*).

In the banded coloration of its abdomen this species resembles *H. formosus*, Auss. (Verh. z.-b. Wien, 1875, p. 177, pl. vi. figs. 17, 18), from Bogota, and *H. pentaloris*, Simon (F. Cambr. Biol. Centr.-Amer., Araneidea, ii. p. 31, 1897), from Guatemala, &c. It may be distinguished from both by having the keel on the palpal spine not rising into a large compressed tooth.

### Genus HOMÆOMMA, Auss.

*Homœomma* Ausserer, Verh. z.-b. Wien, 1871, p. 210 (nec *Homœomma*, Sim.).

? *Agathostola*, Simon, Hist. Nat. Araign. i. p. 163 (1892).

In his diagnosis of the genus Simon says:—"Calcares [*sic*] tibiales maris sat graciles et subacuti, inferior longior et arcuatus; bulbus angustus, usque ad basin teretiusculus, haud carinatus, apice simpliciter tenuissimus."

As a matter of fact, the tibial spurs are almost exceptionally strong, and the spine of the palpal organ is broad, blade-like, and bent almost at right angles with a spiral twist (see figures published by Koch, Ausserer, and Cambridge). Ausserer's diagnosis may be supplemented as follows:—

The bulb of the palpal organ is furnished above with an upwardly-directed process. The protarsus of the first leg closes between the tibial spurs. There is no stridulating-organ of plumose bristles between the basal segments of the first leg and the palp, these segments being clothed with simple hairs or bristles; protarsus of third leg apically scopulate, of fourth not or scarcely scopulate.

*Type.* Species represented by specimens identified by Ausserer as *Eurypelma versicolor*, C. Koch.

The synonymy of the type of this genus is, I believe, as follows:—

*Homœomma nigrum* (Walck.).

*Mygale nigra*, Walckenaer, Ins. Apt. i. p. 214 (1837).

*Mygale* (*Eurypelma*) *versicolor*, C. Koch, Die Arachn. ix. p. 57, fig. 727 (1842) (nec *versicolor*, Walck.).

- Homœomma versicolor*, Ausserer, Verh. z.-b. Wien, 1871, p. 211; id.  
*op. cit.* 1876, pl. vii. fig. 38.  
*Homœomma Stradlingii*, O. P.-Cambridge, Proc. Zool. Soc. 1881,  
 p. 683, pl. lx.

*Loc.* Brazil : Bahia and Rio Janeiro.

A specimen of *M. nigra*, Walckenaer, preserved in the British Museum, and bearing Walckenaer's ticket, and forming part of the collection of M. Lucien Buquet, may be regarded as the type of the species. I believe it to be the female of the species described by Ausserer as *Homœomma versicolor*, and later by Cambridge as *H. Stradlingii*.

In addition to this specimen, the British Museum has three adult male examples from Brazil.

*Homœomma villosum* (Keyserling).

- Hapalopus villosus*, Keyserling, Brasilianische Spinnen, p. 7, pl. i. fig. 2 (1891).  
*Ischnocholus pilosus*, id. *op. cit.* p. 9.  
*Ischnocholus nigrescens*, id. *op. cit.* p. 10.  
*Crypsidromus perfidus*, id. *op. cit.* p. 14.  
*Crypsidromus funestus*, id. *op. cit.* p. 15.

*Loc.* Taquara, in Rio Grande do Sul (*Dr. v. Jhering*).

For discussion of this synonymy, see Pocock (Ann. & Mag. Nat. Hist. (6) xvi. p. 226).

These two species may be distinguished as follows :—

- |   |                         |
|---|-------------------------|
| <p><i>a.</i> Length of carapace 18 millim.; process on palpal bulb short and conical; protarsus of first leg strongly arcuate*, without inferior basal noduliform prominence; carapace shorter than protarsus of fourth leg; tarsal scopulæ of third and fourth legs not completely divided by a band of bristles .....</p> | <p><i>nigrum.</i></p>   |
| <p><i>b.</i> Length of carapace 10 millim.; process on palpal bulb long, cylindrical, with expanded tip; protarsus of first leg scarcely arcuate, with distinct inferior basal prominence; carapace longer than protarsus of fourth leg; tarsal scopulæ of third and fourth legs divided by a band of setæ.</p>             | <p><i>villosum.</i></p> |

Genus METRIOPELMA, Becker.

- ? *Crypsidromus*, Auss. Verh. z.-b. Wien, 1871, p. 194.  
*Metriopelma*, Becker, C. R. Soc. Ent. Belg. 1878, p. cclvi.  
*Crypsidromus*, Simon, Hist. Nat. Araign. i. p. 143 (1892).  
*Miaschistopus*, Pocock, Proc. Zool. Soc. 1897, p. 769.

Simon regards *Metriopelma* as a synonym of *Crypsidromus*, the type of which, namely *isabellinus*, came from Rio

\* C. Koch's figure of *Mygale versicolor* represents the protarsus of this leg as straight.

Janeiro. The male of it, however, is, so far as I can ascertain, unknown, and until it has been determined that the main generic feature of the genus, namely the division of the fourth tarsal scopula, is not due to immaturity, it seems idle to discuss the genus further. Of *Metriopelma* we do know the male.

The genus *Miaschistopus*, which I was led by an error of locality into establishing, is identical with *Metriopelma*.

*Metriopelma velox*, sp. n.

♂.—*Colour* deep mahogany-brown, hairy clothing brown with golden reflections.

*Carapace* scarcely as long as patella and tibia of third leg, a little longer than tibia of fourth, a little shorter than patella, tibia, and tarsus of palp; eyes of anterior line procurved, subequally spaced, the medians a little larger, about half a diameter apart, the posterior edge of the laterals behind the centres of the medians.

*Legs* long and slender, 4, 1, 2, 3; patella and tibia of first subequal to those of fourth and to protarsus of fourth; first leg with one apical spine on femur, one inferior apical spine on patella, two internal, two external, 2, 2 inferiors on the outer side, and 2, 2 at apex, protarsus armed on inner side with three spines, two in basal half, one apical, on outer side with one submedian, and beneath with three apical and two in basal half externally; second leg armed like the first, except that the protarsus is armed with five inferior spines on proximal side of scopula; third leg with two apical spines on femur, two anterior and one posterior spines on patella, tibia armed like that of first, its protarsus armed with about 21 spines; fourth leg with one femoral and one posterior spine on patella, its tibia and protarsus with more spines than on those of second leg. First leg with tibia and protarsus unmodified; third leg with femur considerably thickened; tarsal scopula of fourth completely divided, of third entire; protarsal scopula of first extending almost to base, of second leaving basal third uncovered, of third covering apical third, of fourth scanty. *Labial* and *maxillary spicules* scanty.

*Palp* long, extending past patella of first leg, femur and patella unspined; tibia thick, fusiform, with an external apical emargination, armed above with about twelve spines, whereof eight are apical, and beneath with one external and one internal; palpal organ with short, stout, triangular, externally carinate spine.

*Measurements in millimetres*.—Total length 28; carapace  
*Ann. & Mag. N. Hist. Ser. 7. Vol. xi.* 8

15; palp 26; first leg 59, second leg 55, third leg 49, fourth leg 65; patella and tibia of first 21; tibia of palp 9.

*Loc.* Ecuador: Paramba; Pambelar and Carondelet, both at an altitude of 60 feet (*Rosenberg*).

*Metriopelma trinitatis*, sp. n.

♂.—*Colour.* Integument deep blackish brown, clothed with yellowish-brown hair.

*Carapace* a little longer than patella and tibia of third leg, distinctly longer than tibia of fourth, and slightly exceeding patella, tibia, and tarsus of palp; eyes of anterior line slightly procurved, the posterior edge of the laterals behind the centres of the medians.

*Legs* shorter than in *M. velox*; patella of first with one internal spine and one external apical, its tibia armed with about 25 spines, placed mostly in the basal half beneath and on the inner side; protarsus with one proximal spine beneath. Tibia of second with about twelve spines, three of which are on the inner side; protarsus with three proximal spines beneath; femur of third slightly thickened. Tarsal scopula of third and fourth divided.

*Palp* with two spines on patella, about 23 internal spines on tibia; tibia with external distal anguliform prominence. Palpal organ piriform, the spine short, pointed, with two strong keels, its convex side forming an even curvature with the curvature of the bulb.

*Measurements in millimetres.*—Total length 18; length of carapace 9, width 7·8; length of palpus 12·5, of first leg 31, second 29, third 27, fourth 36·5; patella + tibia of first and of fourth and protarsus of fourth 11.

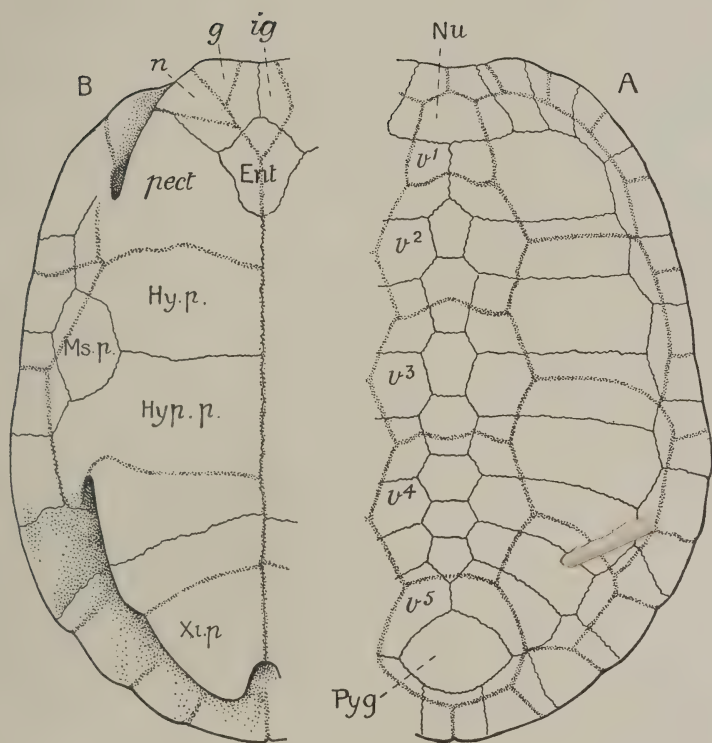
*Loc.* Trinidad (*Walter Ince*).

*M. auronitens*, Keyserling (*Brasilianische Spinnen*, p. 16, 1891, sub *Trechona*) is represented by specimens in the British Museum from Rio Grande do Sul. The species described by Keyserling (*loc. cit.*) as *Trechona pantherina* appears to me to be the female of *auronitens*, in spite of a less procurvature of the anterior line of eyes.

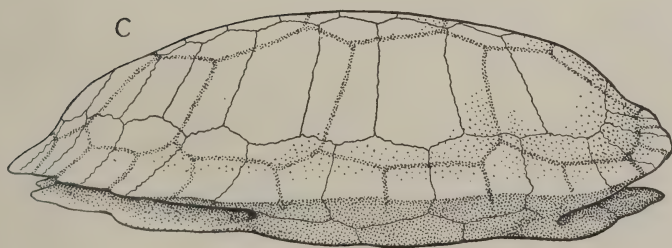
*M. tetricum*, Simon (*Ann. Soc. Ent. Fr.* 1889, p. 212), is represented in the Museum by examples from Caraccas (*Dr. Ernst*), and by examples ticketed West Africa, which served me as the types of the species upon which the genus *Miaschistopus* was based.

*M. familiare*, Simon (*tom. cit.* p. 211), from Caraccas is distinguishable from *M. tetricum* and *M. velox* by possessing only two or three internal apical spines on the tibia of the





$\frac{1}{3}$  nat size



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Fig. 1.

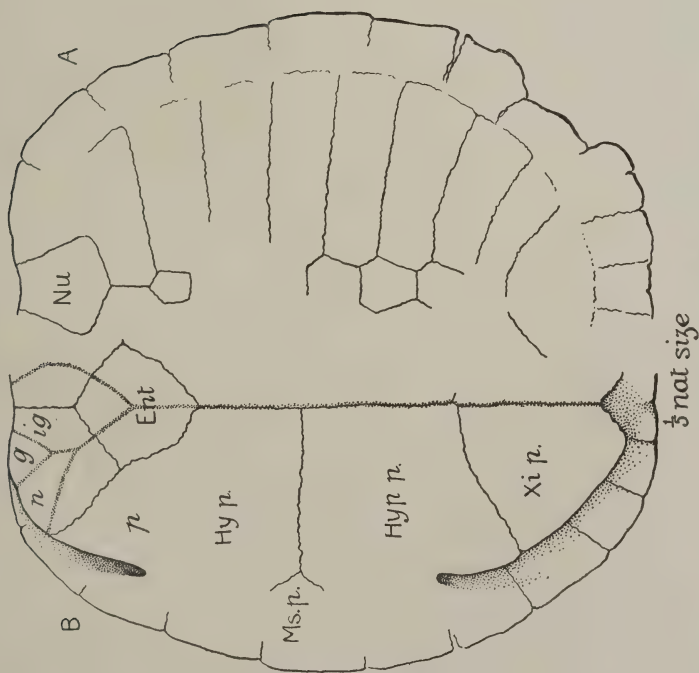
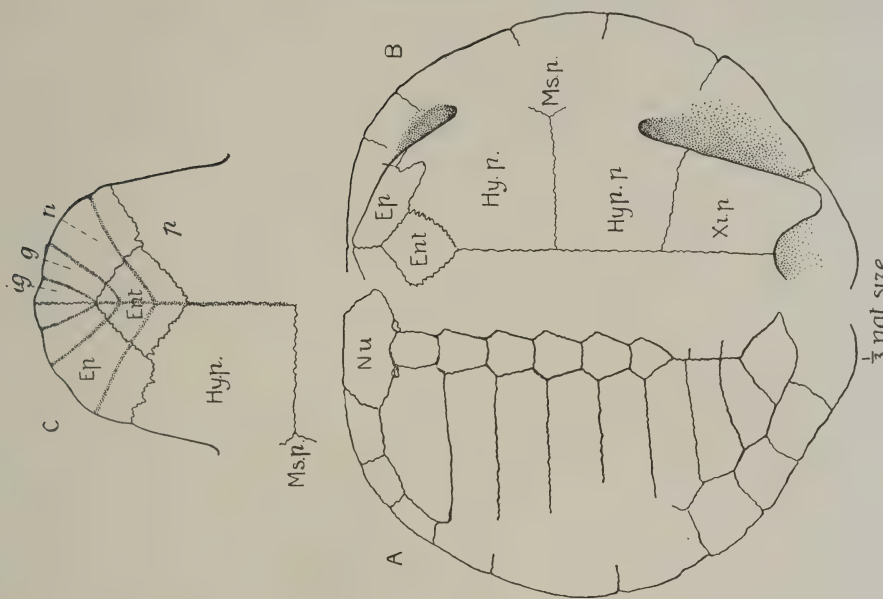


Fig. 2.



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palp, and in having the spine of the palpal organ slender and subfiliform.

The Museum is indebted to Dr. A. Dugès for the specimen here referred to *M. Breyeri*, Becker (Ann. Soc. Ent. Belg. xxi. p. 77, pl. ii. figs. 1-6, 1878), from Guanajuato, the original and only known locality for the species.

The males of the species of *Metriopelma* represented in the British Museum may be tabulated as follows :—

- |   |                    |
|---|--------------------|
| a. Eyes of anterior line strongly procurved, posterior edge of laterals far in advance of centres of medians; palpus short, not extending beyond distal end of patella of first leg ..... | <i>auronitens.</i> |
| b. Eyes of anterior line less strongly procurved, posterior edge of laterals at most a little in advance of the centres of the medians; palp surpassing patella of first leg.             |                    |
| a <sup>1</sup> . Palp very long, twice as long as carapace and extending as far as apex of tibia of first leg .....   | <i>Breyeri.</i>    |
| b <sup>1</sup> . Palp short, less than twice the length of carapace, and not surpassing middle of tibia of first leg.   |                    |
| a <sup>2</sup> . Tibia of palp longer and thicker than patella of first leg; weakly spined internally, but spined above at apex .....   | <i>velox.</i>      |
| b <sup>2</sup> . Tibia of palp not longer and thicker than patella of first leg; strongly spined internally, but not above at apex.   |                    |
| a <sup>3</sup> . Tibia of palp with about a dozen spines, of first leg with about fifteen spines .....  | <i>tetricum.</i>   |
| b <sup>3</sup> . Tibia of palp with about twenty-three spines, of first leg with about twenty-five spines .....   | <i>trinitatis.</i> |

XIV.—On some Pleurodiran Chelonians from the Eocene of the Fayum, Egypt. By C. W. ANDREWS, D.Sc., F.G.S. (British Museum, Natural History).

[Plates VII. & VIII.]

IN the present paper I propose to give a short account of some Pleurodiran Chelonians collected from the Middle and Upper Eocene beds in the Fayum during the last two seasons. One member of the group, *Stereogenys Cromeri*, has already been described, but from the skull only, and a description of the carapace and plastron probably belonging to that species is given below.

*Stereogenys libyca*, sp. n. (Pl. VII.)

One of the finest specimens collected during my expedition to the Fayum in the spring of the present year (1902) is a

nearly complete carapace and plastron of a tortoise from the Upper Eocene beds from which *Palæomastodon* and *Arsinoitherium* have been obtained. This specimen was found in slightly compacted sand, close to one of the numerous groups of logs of silicified wood which form such a characteristic feature on the surface of beds of this age in the region in question. The shell was lying somewhat on its side, so that the left-hand edge was exposed and had been partly removed by the sand-drift, but the rest, comprising considerably more than three fourths of the shell, was preserved, and the pelvic bones were in position. Both carapace and plastron, however, were cracked in every direction, so that it was very difficult to remove the specimen without further injury; at the same time the shell is quite undistorted by pressure and gives an accurate idea of the form of the living animal.

In its general shape this Chelonian resembles *Podocnemis madagascariensis*, but is rather more convex, particularly in the region covered by the last vertebral shield, where there is a well-marked prominence. The carapace is slightly expanded posteriorly.

*The Carapace* (Pl. VII. fig. A).—There are seven neural bones, the series being separated from the nuchal in front and the suprapygal behind by the union in the middle line of the anterior and posterior pairs of costals respectively. The distance between the anterior neural and the nuchal is 46 millim., that between the posterior neural and the suprapygal 19 millim. The anterior neurals are much longer than wide, but they shorten from before backward, so that the posterior ones are wider than long. They are hexagonal in outline (except the first and last, which are pentagonal owing to the suppression of the anterior and posterior faces respectively), and in the anterior ones the antero-lateral border is much shorter than the postero-lateral.

There are eight pairs of costals; as already mentioned, the anterior and posterior pairs meet in the middle line. The nuchal (*Nu.*) is large and is wider than long; its anterior border is emarginate. There are eleven pairs of marginals, of which 4, 5, 6, and 7 form the base of the bridge, and 5 and 6 unite with the mesoplastral (*Ms.p.*). The anterior buttress is opposite the fourth marginal, the posterior one opposite the seventh. The anterior marginals have a rounded edge; the posterior are somewhat expanded and have a sharp edge. The pygal is notched in the middle line by the furrow separating the posterior pair of marginal shields. The suprapygal (*Pyg.*) occupies the summit of the posterior prominence above referred

to; it is roughly triangular in outline, with rounded angles, and is nearly the same shape as the overlying vertebral shield.

There are five vertebral shields (*v.*), the anterior of which is very narrow, much narrower than the underlying nuchal bone; in the recent *Pelomedusa* and *Podocnemis*, the only genera it is necessary to consider in this connexion, the reverse is the case. The remaining plates are roughly hexagonal, the antero-lateral being slightly shorter than the postero-lateral one. The posterior shield, as already mentioned, is very convex; it is nearly the same shape as the underlying suprapygal, but much larger (see Pl. VII. figs. A & C). The costal shields are four in number, the marginals twelve. There is no nuchal shield. On the anterior border of the carapace the extent to which the marginals are exposed is very small, but posteriorly, where the carapace is somewhat expanded, the area is much greater.

*The Plastron* (Pl. VII. fig. B).—The posterior lobe of the plastron is wider than the anterior and the length of the bridge is about the same as the width of the front lobe.

The entoplastron (*Ent.*) is a relatively small escutcheon-shaped bone, from the outer angles of which the sutures between the epi- and hyoplastra run forward at an angle of about  $45^{\circ}$  with the long axis of the shell and cut the border of the plastron in the notch marking the end of the groove between the humeral and pectoral shields. The suture between the hyo- and hypoplastra (*Hy.p.* and *Hyp.p.*) crosses at the level of the middle of the bridge and terminates externally at the inner angle of the mesoplastra (*Ms.p.*), which are thus wedged in between the marginals 5 and 6 and the inner ends of the hyo- and hypoplastra. The mesoplastra are considerably longer than broad. The suture between the hypo- and xiphiplastra (*Xi.p.*) runs parallel to and about 3 centim. in front of the groove between the femoral and anal shields. There is a deep rounded notch between the posterior ends of the xiphiplastrals.

The intergular shield (*ig.*) is very large and extends back as far as the middle of the entoplastron, separating both the gulars and the humerals. This condition, as far as I know, occurs in no other Pleurodiran except in the shell described below and referred provisionally to *Stereogenys Cromeri*. Both the gulars (*g.*) and the humerals (*n.*) are very small; the pectorals (*pect.*), on the other hand, are very large, the suture between them and the abdominals runs across about 3 or 4 centim. behind the anterior end of the bridge. The limits between the abdominals and the femorals and between the latter and the anals are shown in the figure.

The grooves marking the boundaries of the epidermal shields are fairly clearly marked both on the carapace and plastron.

The upper surface of the hinder region of the plastron bears the bases of the ischia and pubes, which are closely united with it, in the manner characteristic of the Pleurodira. When found the pelvic girdle was *in situ*, but was broken away in removal. As far as can be seen, the pelvis differs in no essential respect from that of *Podocnemis*.

*Systematic Position*.—The presence of mesoplastra shows that this tortoise is referable to the Pelomedusidæ, and the small size and lateral position of those elements further show a close relationship with *Podocnemis* and *Pelomedusa*. The large size of the plastron and the width of the bridge between it and the carapace indicate a closer relationship with the former of these two genera than with the latter: indeed, at first it seemed possible to refer this species to *Podocnemis*, but further consideration, aided by the advice of Mr. G. A. Boulenger, leads to the conclusion that its generic separation is justifiable. The chief points in which it differs from *Podocnemis* are:—

- (1) The narrowness of the anterior vertebral shield, which is narrower than the underlying nuchal.
- (2) The large size of the intergular and the separation of the gulars and humerals by it.
- (3) The separation of the series of neural bones both from the nuchal in front and the suprapygal behind.
- (4) The comparatively slight degree to which the buttresses are developed.
- (5) Another point that may be of some significance is that in the fossil the anterior border of the plastron is not convex but concave, though to a slight extent only, and behind the antero-lateral angles the bone is considerably thickened, so that the upper surface of the plastron is gently concave from side to side in the middle line, the shallow depression being bounded by the thickened ridges just mentioned.

All these characters except the first (which, owing to the imperfection of the specimens, cannot be observed) occur in the Chelonians from the Middle Eocene which are described below and referred to *Stereogenys Cromeri*, because they are found both on the same horizon and in the same locality as the skulls on which that species was founded, and with them are the commonest of the Chelonian remains. The present species, also, will therefore be referred provisionally to the same genus and its specific name will be *Stereogenys libyca*; it differs from



*S. Cromeri* in the narrower form of the shell and the different shape of the entoplastron; moreover, the beds in which it is found are much later, and all the species of mammals in them are different from those occurring in the lower beds.

The small development of the buttresses compared with those found in *Podocnemis* and other recent Pleurodirans, as well as the form and the thickening of the anterior portion of the plastron, may indicate that this species and that next described were more terrestrial in their habits than the modern members of the group.

The dimensions of the type specimen of *Stereogenys libyca* are:—

	centim.
Length of carapace in the middle line .....	41·5
Greatest length of plastron .....	40
Length of plastron in middle line .....	36·5
Width of anterior lobe of plastron .....	17·4
"          posterior          "          " .....	20·5
Length of bridge .....	17·7
Approximate width of shell .....	32

*Stereogenys Cromeri*, Andrews \*. (Pl. VIII. fig. 1, A & B.)

The specimens from the Middle Eocene just mentioned as being referred to *Stereogenys Cromeri*—a species founded on a skull and mandible—were collected last year by Mr. H. J. L. Beadnell and myself in the neighbourhood of Qasr-el-Sagha (Schweinfurth's Temple). Portions of the shell of this Chelonian are, like the fragmentary skulls, common in these beds, and in one case a nearly complete, though somewhat crushed, shell was found; this specimen is here described. It is unfortunate that in these deposits the shells are usually more or less thickly coated with gypsum and other substances, which greatly obscure and often entirely conceal the lines of division between the various plates and shields.

In the nearly complete shell the carapace has been to some extent flattened and, at the same time, widened by pressure. Its dimensions in its present state are:—Length in a straight line 46·5 centim., width 41·5.

*The Carapace* (Pl. VIII. fig. 1, A).—The number of neural bones cannot be determined, but it seems certain that, as in the last species, the neural series is separated both from the nuchal and pygal bones by the junction in the middle line of the anterior and posterior pair of costals respectively. There are eight pairs of costal plates, but the number of marginals

\* "Preliminary Note on some recently discovered Extinct Vertebrates from Egypt. (Part II.)" Geological Magazine, dec. iv. vol. viii. (1901), p. 442.

cannot be made out. The nuchal bone is large and its anterior border is emarginate.

Scarcely any trace of the outlines of the epidermal shields remains, but the two middle vertebrals seem to have been large and roughly hexagonal in outline.

*The Plastron* (Pl. VIII. fig. 1, B) —The plastron is large; its total length is about 44 centim.; the length of the bridge is 20.5; the width of the anterior lobe 24; the width of the posterior lobe 24. The entoplastron (*Ent.*) is large and rhomboidal, and the sutures between the epi- and hyoplastrals running out from its outer angles terminate on the edge of the plastron in the groove between the humeral and pectoral shields, as in the last species. The suture between the hyo- and hypoplastrals (*Hy.p.* and *Hyp.p.*) crosses the middle of the bridge and terminates in the inner angles of the small rhomboidal mesoplastrals (*Ms p.*), which are wedged in between the marginals and the outer ends of the hyo- and hypoplastrals. The position of the suture between the hypo- and xiphiplastrals is shown in fig. 1 B, Pl. VIII. The posterior portion of the plastron seems to have been notched much as in *Stereogenys libyca*, but none of the specimens are quite complete in this region.

The arrangement of the horny scutes in the plastron is similar to that seen in *S. libyca*, the intergular (*ig.*) being very large and separating both the gulars (*g.*) and the humerals (*n.*); it extends as far back as the middle of the entoplastron. The other shields present no important peculiarity so far as can be seen. As remarked above, there can be little or no doubt that the Chelonian just described and *Stereogenys libyca* belong to the same genus; but there is some doubt as to whether the shell here referred to *S. Cromeri* really belongs to that species, the type of which is a skull and mandible (see *Geol. Mag.* 1901, p. 442). Although, however, the skull has never been found actually associated with the shell now described, the probability that they belong to one and the same animal is so great that it is certainly advisable to refer them to one species until the contrary can be proved.

*Podocnemis antiqua*, sp. n. (Pl. VIII. fig. 2, A & B.)

Another Pleurodiran tortoise of smaller size was collected from the Middle Eocene beds. This species differs considerably from that just described both in its general form and in some points in the structure of its shell. The carapace is shorter and broader and more highly arched anteriorly; the nuchal border is quite straight, there being no trace of any emargination. Posteriorly the carapace is less convex and

narrows suddenly, so that its outline, as a whole, is somewhat pear-shaped.

There are six neurals, the anterior one being in contact with the nuchal in front, while the hinder one is separated from the suprapygal by the union of the hinder portions of the sixth pair of costals and of the seventh and eighth pairs in the middle line. The anterior neurals are much longer than broad, and their antero-lateral borders are much shorter than their postero-lateral ones. The last neural terminates posteriorly in a point and is pentagonal. There are eight pairs of costal bones, the first, as usual, being much the largest. The nuchal is wide and its anterior border is nearly straight and without any emargination. There is a lacuna in the shell at the junction of the nuchal, the first neural, and the first costal. The marginals are not well preserved, there are ten or eleven pairs of them. The suprapygal is roughly triangular in form.

*The Plastron*.—In the plastron (see Pl. VIII. fig. 2, B) the entoplastral bone is rhomboidal in form and the sutures between the epi- and hyoplastrals run outwards and backwards from its outer angles and then turn forward; the sutures are very complex, the different elements interdigitating very deeply. The suture between the hyo- and hypoplastral crosses about the middle of the bridge and terminates at each end in a small mesoplastral.

The bases of the pubis and ischium are fused to the plastron in the manner usual in the group. Unfortunately all traces of the grooves marking the boundaries of the epidermal shields are wanting both in the carapace and plastron.

The small size of this tortoise and the fact that it is found in the same beds as *Stereogenys Cromeri* may give rise to the suspicion that it is the young of that species; but the differences above described are so considerable that it seems advisable to regard it as a distinct species until the contrary is proved.

The dimensions of the type specimen of *Podocnemis antiqua* are :—

Total length of the shell .....	centim.
" " plastron .....	20·2
Width of anterior lobe of the plastron .....	18·6
" " posterior " .....	10
Approximate width of carapace .....	8·5
	20

*Podocnemis fajumensis*, sp. n. (Pl. VIII. fig. 2, C.)

In the Upper Eocene beds remains of another small Pleurodiran are not uncommon. This species differs widely

from *Stereogenys libyca* in the arrangement of the epidermal shields of the plastron, the anterior portion of which is shown in the figure. It will be seen that the intergular shield (*ig.*) is very small, and instead of separating both the gular (*g.*) and humeral (*n.*) shields, it does not even completely separate the gulars, which meet in the middle line for some distance. The entoplastron is also different from that of *S. libyca*, being a diamond-shaped bone. There is a small laterally-placed mesoplastron. As far as at present known, there seems to be no reason for not referring this Chelonian to the genus *Podocnemis*, and the name *Podocnemis fajumensis* may be adopted for it. The specimen figured was collected by Mr. Beadnell in the season of 1902.

The approximate width of the plastron figured, immediately in front of the bridge, is 11.5 centim.

The Chelonian fauna of the Middle and Upper Eocene beds of the Fayum seems to be a very rich one, for, although the region is still very imperfectly known, a considerable number of species, including representatives of all the main groups, have already been discovered. From the Middle Eocene we have *Psephophorus eocænus*, *Thalassochelys libyca*, *Stereogenys Cromeri*, and *Podocnemis antiqua*, which occur associated with the mammalian genera *Mæriotherium*, *Barytherium*, *Eosiren*, and *Zeuglodon*, and with the Ophidians *Gigantophis* and *Pterosphehus* (*Mæriophis*). From the Upper Eocene in addition to *Stereogenys libyca* and *Podocnemis fajumensis* there is a gigantic land-tortoise, apparently allied to *Testudo perpiniana*, Deperet, which will be described elsewhere; associated with these Chelonians occur remains of *Palæomastodon*, *Arsinoitherium*, *Phiomia*, *Saghatherium*, &c.

#### EXPLANATION OF THE PLATES.

##### PLATE VII.

*Stereogenys libyca* (type specimen). A, carapace; B, plastron; C, right side of shell. About  $\frac{1}{3}$  natural size.

##### PLATE VIII.

Fig. 1. *Stereogenys Cromeri*. A, carapace; B, plastron. About  $\frac{1}{3}$  natural size.

Fig. 2, A & B. *Podocnemis antiqua* (type specimen). A, carapace; B, plastron. About  $\frac{1}{3}$  natural size.

Fig. 2, C. *Podocnemis fajumensis* (type specimen). Anterior portion of plastron.  $\frac{1}{3}$  natural size.

*Ent.*, entoplastron; *Ep.*, epiplastral; *Hy.p.*, hyoplastral; *Hyp.p.*, hypoplastral; *Nu.*, nuchal bone; *Ms.p.*, mesoplastral; *Pyg.*, suprapygial; *Xi.p.*, xiphiplastral; *g.*, gular shield; *ig.*, intergular shield; *n.*, humeral shield; *p.*, pectoral shield; *v.*, vertebral shield.



XV.—*On new Species of Mus from Borneo and the Malay Peninsula.* By J. LEWIS BONHOTE, M.A.

IN working out the extensive collection of mammals recently brought home by Messrs. Robinson and Annandale from the Malay Peninsula, I find that the following species in the British Museum from Borneo are undescribed. I have added a preliminary description of one of the species brought home by Messrs. Robinson and Annandale which belongs to this group.

I have to express my thanks to Mr. Gerritt S. Miller, of the U.S. National Museum, for kindly lending me specimens of his recently described species from the Malay Peninsula for comparison.

*Mus rapit*, sp. n.

Similar in size and general coloration to *Mus pellax*, Miller, but with slightly longer tail and smaller skull. Fur thick and ample, intermixed with soft spines, so soft as in some cases to be hardly felt.

General colour tawny ochraceous, intermixed with black, which predominates along the centre of the back. Underparts pale cream, sharply defined from the colour of the back. The light colour does not extend to the foot. Feet dark brown, the toes and a line on either side from the ankle white; on the fore legs the white colour is continuous with that of the underparts. Tail very long and ending in a pencil of hairs; colour at the root and along the upper surface dark brown, below lighter but not sharply defined.

The *skull* is apparently (I have no specimens with which to compare) very similar to that of *Mus pellax*, Miller, but very slightly smaller. The bullæ are very small and the muzzle long and narrow. There is a slight swelling on either side between the ends of the nasals and roots of the zygoma and the supraorbital ridges are well marked. The nasals are long and taper towards their posterior end, which is, as in *Mus pellax*, some way behind the nasal branches of the premaxillary.

Dimensions of type (from dried skin):—Head and body 173 millim.\*; tail 223\*; hind foot 29·5.

*Skull*.—Palatal length 16·5 millim.; diastema 11; length of incisive foramina 6·5; length of nasals 15; zygomatic

\* Probably stretched.

breadth (approx.) 18; interorbital breadth 6·5; greatest breadth of brain-case 16; length of molar series (alveoli) 6.

*Hab.* Mount Kina Balu, Borneo.

*Type.* B.M. 93. 4. 1. 15. Kina Balu, Borneo. Collected in October 1892 by Mr. A. H. Everett.

This species is quite distinct from all others except *pellax*. The greater length of the tail and the presence of hairs at its extremity form a ready method of distinction.

I have named this species "*rapit*" from its local Bornean name.

On further investigation I find that the type of *Mus Jerdoni*, now in the Calcutta Museum, is only half-grown. Mr. Thomas, in his paper on the Indian species of *Mus*\*, gives the measurements of adult *Jerdoni* as—head and body 5·3 inches (135 millim.), tail 7–8 inches (190 millim.); thus making it to agree fairly well with *Mus pellax*, which is probably a synonym. If this should prove to be so, the present species is the Bornean form of *Mus Jerdoni*.

*Mus kina*, sp. n.

General size, colour, and characters as in *Mus cremoriventer*, Mill. Fur very numerously beset with short soft spines. General colour light ochraceous, much paler than in *Mus rapit*, interspersed with *very long* black hairs, most conspicuous on the central dorsal region. Underparts (including the inner sides of the limbs) dull white, the colour being sharply marked off from that of the back. Tail longer than the head and body, nearly uniform in colour throughout, having only a slightly lighter tinge on the underside. Hind feet dark brown, edged with ochraceous, the toes and a small margin to the ankle white. Fore feet whitish, slightly suffused with ochraceous.

Whiskers as well as the eye-bristle black and very long.

*Skull.*—Similar to that of *Mus cremoriventer*, but somewhat larger. The nasals, longer than those of *cremoriventer* and tapering, end posteriorly in the same line as the præmaxillæ. The supraorbital ridges are well marked, but diverge more gradually over the anterior portion of the brain-case than in *cremoriventer*. On the underside, except in size, the skull does not offer any noticeable points of difference; but the afterpart of the skulls of my series being cut off, I have been unable to compare the size of the bullæ &c.

\* P. Z. S. 1881, p. 539.

Dimensions of type (measured in the skin):—Head and body 146 millim.; tail 176; hind foot 26.

*Skull*.—Palatal length 15 millim.; diastema 9·5; length of incisive foramina 6; length of nasals 13·5; zygomatic breadth 16·5; interorbital breadth 6; greatest breadth of brain-case 15; length of molar series 6.

*Hab.* Mount Kina Balu, Borneo.

*Type*. B.M. 94. 7. 2. 24. Mount Kina Balu. Collected in January 1894 by Mr. A. H. Everett.

Although from the skins there is apparently little difference between this species and *Mus cremoriventer*, the larger size of the skull will enable it to be very easily recognized. Not having any measurements in the flesh, it is difficult to say whether it would be recognizable by its size without reference to the skull.

*Mus bukit*, sp. n.

Similar in appearance to *Mus cremoriventer*, Mill., but larger, approaching in size to *Mus rapit*.

Fur densely studded with soft white spines. Above dull ochraceous, intermixed with *short* black hairs. Below yellowish white. Tail bicolor and slightly longer than head and body.

*Skull*.—Similar to that of *M. rapit*, but with shorter muzzle and larger bullæ. Supraorbital ridges conspicuous and well marked, extending backwards to inferior margin of parietals. Anterior root of zygoma broad, much broader than in *M. rapit*.

Dimensions (measured in the flesh):—Head and body 121 millim.; tail 148; hind foot 24·5.

*Skull*.—Greatest length 37 millim.; palatal length 16; diastema 9·5; length of nasals 15; zygomatic breadth 18.

*Hab.* Bukit Besar, Jalor, 2500 feet.

*Type*. Ad. ♂. Bukit Besar. Collected 10th May, 1901, by Messrs. H. C. Robinson and N. Annandale. Original number 11.

An easily distinguishable form of the *Mus Jerdoni* group, of which there are specimens in the Museum from Siam. The above is only a preliminary description; a full description and measurements will be published in the report on Messrs. Robinson and Annandale's collection.

XVI.—*The Hares of Crete and of Cyprus.*

By G. E. H. BARRETT-HAMILTON.

PAYMASTER H. O. JONES, R.N., to whom the British Museum is indebted for specimens both of the beech-marten and the badger of Crete, has now sent me four examples of the hare of that island. These cannot be assigned to any known form of hare inhabiting the shores of the Mediterranean or its islands. I therefore propose for them the name of

*Lepus creticus*, sp. n.

Size about equal to that of *L. europæus occidentalis*, de Winton. Dorsal underfur white. Long hairs of upper surface annulated with black and very light buff rings, the tips black. Towards the rump the buff becomes white, the whole coat silky, and the black rings inconspicuous, so that the rump is distinctly marked off by its colour from the remainder of the upper surface. Very little trace of rufous intervenes on the flanks between the colours of the upper and under surfaces. The nuchal patch, throat, breast, thighs, and anterior surfaces of the fore legs are buff, this colour extending in some specimens to the belly in the neighbourhood of the thighs. The remainder of the under surface and of the legs, together with the chin, are white. The upper surface of the head resembles the back, but is slightly darker, and here the underfur is buff. The cheeks and sides of the head are grizzled and nearly white. The ears are tipped with black and are nearly white on the posterior external surface, as well as in their interior and along the margins; the anterior external surface is coloured like the back.

The exact proportions of the animal are uncertain, since no measurements accompanied the specimens.

Four examples were forwarded, of which the particulars are as follows. The dimensions are in millimetres, and were taken from the dried specimens:—

Brit. Mus. no.	Hind foot.	Ear.	Basal length of skull.
99. 2. 14. 1 .....	125	105	73 { *
99. 2. 14. 2 .....	124	101	76 {
2. 11. 9. 1, 27th Feb., 1901	}	}	78
(type of species) .....			
2. 11. 9. 2, ditto .....	..	..	81

The description of *Lepus creticus* is not intended to be complete, but simply to be sufficient for its distinction from other

\* These two skins were purchased in open market. It is uncertain to which skin either skull belongs.



forms. There are so many Mediterranean hares, and so little is known of them, that it would be as yet impossible to state the exact affinities of any. *Lepus creticus* is a pale form, readily distinguishable from all those inhabiting neighbouring regions by its light-coloured rump. In this respect, although by no means in the remainder of its coloration, it resembles British winter examples of *L. europæus occidentalis*.

The opportunity may here be taken to describe the hare of Cyprus—a small form allied in colour to that of Crete, but lacking the light rump. As in *L. creticus*, the underfur, except on the head, is white, but the buff of the upper surface is slightly yellowish and the black browner than in that species. The nuchal patch, throat, breast, thighs, and anterior surface of the fore legs are more rufous, and the cheeks are tinged also with that colour. There is no white on the ears. The animal is altogether less pale than *L. creticus*. It may be known as

*Lepus cyprius*, sp. n.

As in the case of *L. creticus*, this note is without prejudice to future investigation, which may indicate, more accurately than is now possible, exact specific or subspecific affinities.

I have seen three examples of *L. cyprius*, all of which were presented to the British Museum by the late Lord Lilford. They are without dimensions.

		Basal length of skulls averages	
78. 7. 3. 5 (type of species).	Cyprus.	70 mm.	} All three skulls are much damaged.
— 6.	"		
— 7.	"		

It is noteworthy that the moderately light coloration of the hare of Crete is paralleled by that of the badger, *Meles meles mediterraneus*\*, of the same island.

# BIBLIOGRAPHICAL NOTICES.

*Dr. Günther's Monograph of the Reptiles and Batrachians of Central America.*

*Biologia Centrali-Americana.—Reptilia and Batrachia.*

By ALBERT GÜNTHER. London, 1885–1902. Pp. xx & 326; 76 pls.

OUR first duty in noticing an elaborate and sumptuously illustrated volume like the one before us is to congratulate the learned author on the completion of his task, and the patience with which he has continued his labours for more than fifteen years. The reasons for

\* See Ann. & Mag. Nat. Hist. ser. 7, vol. iv. (Nov. 1899) pp. 383–4.

the long period of time which elapsed between the issue of the first and the final fasciculus are, we are told, twofold. In the first place, a large portion of the author's time was taken up by official and other duties, to which attention was imperative, so that only spare hours (if such exist in the life of a busy naturalist) could be devoted to the present volume. In the second place, collectors were busy in obtaining and sending home consignments of reptiles and batrachians from various parts of Central America, and it was accordingly deemed advisable to await the arrival of as many of these as possible. All these numerous collections added much to our knowledge of the reptilian and batrachian species from the area under consideration, and their geographical distribution; but even with these important additions the author has still to lament many gaps in the available information. Apparently the districts best known from a reptilian point of view are the plateau and highlands round the city of Mexico; but it is satisfactory to learn that the Government of Costa Rica has been at special pains to explore its territories and collect the fauna.

One disadvantage inevitably connected with a work which has been so many years in course of publication is that the earlier portions must be somewhat out of date, for what was doubtless first-rate zoology in 1885 may not be in all respects so good in 1902. This disadvantage is fully acknowledged by the author in the Introduction, where it is stated that much supplementary labour and time will be necessary to correlate the earlier portions of the work with the information which has been acquired and the redeterminations which have been made subsequently to the dates of their publication. This supplementary information, together with a report on collections received too late for notice in the volume before us, will, it is hoped, be issued in a separate form at no very distant date.

A total of 695 species is recorded in this volume, many of which are described as new. In the case of the Reptiles only forms of which previous accounts were unsatisfactory are described at length; but as regards the Batrachians this practice has been abandoned in favour of a comparatively full history of each. In accordance with the traditions of the '*Biologia*,' as a whole, the plates illustrating Dr. Günther's volume are for the most part beautiful examples of lithography, while the nine which have been printed wholly or partially in colours are beyond praise.

A special feature of the work is the attention bestowed on the geographical range of the various species which come under review. The tables, occupying eight closely printed pages of the Introduction, which are devoted to the elucidation of this part of the subject, afford by themselves some indication of the enormous amount of labour and attention bestowed by the author on his task.

The main scope of the work is, of course, the systematic description of the cold-blooded land vertebrates of Central America and Southern Mexico; and the details of this can only be of interest to students of this branch of zoology. Much more importance

attaches to the author's remarks on the general relations of the fauna under consideration.

"Forming the connecting link between the two Neogæan regions," observes Dr. Günther, "Central America possesses a Reptilian and Batrachian Fauna with the various constituent elements so mixed that, if only certain families or genera were taken into consideration, almost every district of this area could be associated with either the North- or South-American region. The tropical Fauna, of course, gradually changes into, or is replaced by, that of the temperate region, as we proceed from lower to higher latitudes; but this change is not uniform throughout the breadth of the land; the two faunas overlap each other in deep and manifold indentations. Tropical forms are found to preponderate in the low lands of the Atlantic side, which expand into the broad Yucatan peninsula, and on the humid slopes of moderate elevation; some extend to, and even reach northwards of, the Rio Grande. On the Western side they are found in similar localities, but in a narrower belt, along the Pacific coast. On the other hand, numerous types of the southern North-American Fauna are spread over Northern Mexico, extending along the Central-American plateau to the extreme limits of our area, and even beyond. This southward extension of northern types is due partly to the identical physical conditions of the arid tableland of Sonora and Chihuahua, which is merely a continuation of that of Arizona and New Mexico, and partly to the great altitude and temperate climate of the Central-American plateau.

"Thus, a boundary-line between the North- and South-American regions cannot be drawn; the whole of Central America is a transition-tract which, unlike any other part of the world, shows the most extraordinary diversity of climatic, physical, and meteoric conditions within comparatively small areas, favouring the evolution of a great variety of types of genera and species, and influencing the dispersal of species from the North and South."

Some expression of opinion from the author as to the origin of the reptile fauna of South America would have been welcome; but this may have been beyond the scope of the 'Biologia,' or may perhaps be touched upon at the completion of the entire work.

As regards the systematic portion of the work, a very few words must suffice—partly because the present reviewer does not feel himself competent to discuss details, and partly because such a discussion would not be of interest to the majority of the readers of this journal.

Speaking generally, it may be affirmed that Dr. Günther is disposed to regard genera and species in a broad and comprehensive sense. For example, he takes the genus *Alligator* to include the caimans and jacares of Central and South America, which are classed by many other writers as a group apart, under the barbarous title "Caiman." Doubtless there is much to be said in favour of the author's view—the non-division of the nostrils by the nasals and the presence of bony scutes on the under surface in

the caimans not being features of much importance, especially since the Chinese alligator has vestiges of scutes on the abdomen. On the other hand, it is a matter of convenience to separate the essentially southern caimans from the northern alligators.

Another example of the wide sense in which generic terms are employed is the inclusion of the terrapins, frequently classed as *Nicoria* and *Clemmys*, in the older genus *Emys*. In respect to species of this group we notice some discrepancy between the views of the author and those of other writers. For instance, the author's *Emys salvini* has been identified with *Chrysemys ornata*, and *E. umbra* with *C. grayi*, while *E. pulcherrima* has been regarded as only a local form of *Nicoria punctularia*.

Again, *Crocodylus Moreletii*, which the author regards merely as a variety of the common *C. americanus*, is placed by another writer in quite a distinct section of the genus. On the other hand, the form classed by Dr. Günther as a variety of the last-named species, with the affix var. *acutus*, is not recognized at all by the writer referred to.

We shall await an expression of opinion on these and other points by the author in his promised supplement.

In the meantime it is satisfactory to find that the author is in favour of amending the orthography and transliteration of scientific names, when necessary, instead of blindly following the errors of a describer who may have had the misfortune to lack a classical education. As an example, we notice the modification of Spix's *Kinosternon* to *Cinosternum*; but here we may venture to suggest that, in our opinion, it would have been better to have given the original spelling when quoting the original reference. May we hazard the conjecture that had the author seen fit to separate the caimans from the alligators, he would have modified the barbarous "*Caiman*" into "*Caimania*," or some other form less inharmonious with classical usage?

Finally, we have again to offer our hearty congratulations to Dr. Günther on the successful completion of his arduous task, and we may likewise take the opportunity of felicitating Mr. Godman on having secured his services as a contributor to such a monumental undertaking as the '*Biologia Centrali-Americana*.'

R. LYDEKKER.

*A Natural History of the British Lepidoptera. A Textbook for Students and Collectors.* By J. W. TUTT, F.E.S., Author of '*The British Noctuæ and their Varieties*,' '*Monograph of the British Pterophorina*,' '*British Butterflies*,' '*British Moths*,' &c. Vol. III. London & Berlin: July 1902. Pp. xi, 558.

AFTER an interval of but little more than two years, we have again the pleasure of reviewing another volume of Mr. Tutt's enormously laborious and comprehensive work on the British Lepidoptera. The size and the manner of execution are similar to the two preceding volumes; but it is entirely systematic, as no space could be spared



for chapters on general subjects; and, perhaps as a consequence, vol. iii. contains no illustrations.

We are glad to see that Mr. Tutt has adopted a suggestion made by some of his critics, and has given a somewhat fuller table of contents, which will much facilitate the use of the book. One further suggestion we might make, with regard to the terminal Index, that when the same insect (say "*meridionalis* var., *Lasiocampa*," on p. 550, col. 2) is referred to under several pages (28 in the instance quoted, and sometimes more in other cases) the page where the notice of the insect begins, or where it is described, might be placed first, which would frequently obviate the waste of time involved in turning up every page till that most likely to be required is reached.

Volume iii. contains the "conclusion" (? continuation) of what Mr. Tutt calls the "Sphingo-Micropterygid Stirps," and includes the *Lachneides*, *Dimorphides*, *Attacides*, and part of *Sphingides*, the entire volume being devoted to 13 species only, viz. *Pachygastria trifolii*, *Lasiocampa quercus*, *Macrothylacia rubi*, *Cosmotriche potatoria*, *Gastropacha ilicifolia*, *Eutricha quercifolia*, *Dimorpha versicolora*, *Saturnia pavonia*, *Mimas tiliae*, *Smerinthus ocellata*, *Amorpha populi*, and *Hemaris fuciformis* and *tityus*. Of course every species will not require to be treated at the same length as *Lasiocampa quercus*, which occupies (as a species) no less than 69 of Mr. Tutt's closely-printed pages; but we tremble to think of the number of volumes and the number of years which will be required to deal with over 2000 species of British Lepidoptera on the same scale. On pp. 55-57, 246, 247 we have a list of 47 named varieties of *L. quercus* and aberrations, all but 13 named by Mr. Tutt himself. Is not this rather overdoing it? Much attention, too, is paid to gynandromorphism, hybridism, &c. in this and other species.

Turning to more general matters, the abstracts given of different systems of classification of groups, often taken from old or scarce books, will be most useful to all students who have not access to the best entomological libraries. Mr. Tutt seems to aim at making his book a huge compendium and cyclopædia of all that has been published on the species of which he treats; and it will be of great value to generalizing entomologists, who will be able to sift from it a great amount of valuable information in furtherance of their species studies. A large amount of information is given respecting foreign species, especially those of Continental Europe and North America; and also on parasites, and various other topics incidentally connected with the main subject of the work.

We are sorry to find that there is only a meagre list of new subscribers since the last volume; but as the work is necessarily too costly for many entomologists, and must become increasingly so with the publication of each volume, we would wish to emphasize its great value as a book of reference for public Natural History or Entomological Libraries, especially at a distance from London, or the University towns, which alone possess full series of the books to which Mr. Tutt's work is largely an abstract—not that we do not also fully recognize the large amount of material due to the original observations of Mr. Tutt and his coadjutors, which is published here for the first time.

W. F. K.

*The Fauna and Geography of the Maldive and Laccadive Archipelagoes.* Edited by J. STANLEY GARDINER, M.A. Vol. I. Parts III. & IV. Cambridge: at the University Press. London: C. J. Clay & Sons. 1902.

THE great feature of this important work is undoubtedly Mr. Gardiner's contribution dealing with the Formation and Growth of Coral-Reefs, which was begun in Part I. In the two parts which have since appeared, this subject, profusely illustrated with charts and diagrams, is still further pursued and is not yet finished.

The sections, in Part III., on the Formation of Lagoons, the Rate of Growth of Corals and Reefs, and the Action of Boring and Sand-feeding Organisms are not only extremely interesting, but also most important contributions to our knowledge of these subjects.

Of the numerous purely Zoological Reports, some are necessarily of more interest than others. In Part II. we may specially mention those on the Echiuroidea and Sipunculoidea, by A. E. Shipley, M.A.; the Marine Crustacea, by L. A. Borradaile, M.A.; the Chaetognatha, by L. Doncaster, B.A.; and that "On the Pigments of certain Corals, with a Note on the Pigment of an Asterid," by Dr. MacMunn.

Part III. contains five Zoological Reports. In one of these Mr. Borradaile continues his description of the Marine Crustacea. Of the remaining four, attention must be drawn to that by Prof. Jeffrey Bell, M.A., on "The Actinogonidiate Echinoderms of the Maldive and Laccadive Islands," on account of his suggestive remarks on the reproduction of Ophiurids; and to that by Frank Laidlaw, B.A., on "The Marine Turbellaria."

*Publications of the British Museum of Natural History,  
South Kensington.*

*Guide to the Galleries of Mammalia.* Seventh Edition. Pp. 126; 65 woodcuts. 1902.

*Guide to the Coral Gallery.* Pp. 73, with numerous Illustrations. 1902.

THE Natural History Guides of the British Museum are marvels of cheapness and models of exposition.

The Guide to the Galleries of the Mammalia has just reached the seventh edition. Turning over its pages one sees that this last edition is no mere reprint, but has been thoroughly revised and brought up to date, several new figures having been added to this end. Amongst the most conspicuous of these are the heads of the Somali zebra and the North-African giraffe, and a really excellent drawing of the okapi.

The Guide to the Coral Gallery, which fills a long-felt want, may be truthfully described as a wonderful production, both on account

of the number and beauty of the illustrations and of the prodigious amount of most useful and readable information that has been crowded into the text.

The volume contains terse descriptions of the Protozoa, Porifera, Hydrozoa, and Anthozoa. Brief though the accounts of these groups are, yet space has been found to enumerate the systematic position of each, the anatomical structure and life-history, and their economic importance where such occurs.

The authors, Prof. Jeffrey Bell and Mr. Kirkpatrick, are to be heartily congratulated on having accomplished a most difficult task in a really admirable manner. They have produced a book that should meet with a warm appreciation from those for whom it has been specially prepared.

Only an institution like the British Museum could afford to issue such a volume for the sum of *one shilling*!

*Catalogue of Birds' Eggs.* Vol. II. By EUGENE W. OATES.  
Pp. 400; pls. xv. 1902.

WE must congratulate Mr. Oates on the completion of the second volume of this really valuable work, which commences with the Charadriiformes and concludes with the Strigiformes.

In an all-too-brief Introduction Mr. Oates tells us that the eggs of 726 species have been described, representing some 1500 specimens. The description of these eggs is published without any comment whatsoever; and though this, perhaps, in a Catalogue is all that is required, we cannot refrain from expressing a wish that Mr. Oates had given us, from his stores of knowledge, some account of the extent, trend, and probable significance of the variations presented by the eggs of the birds dealt with in this volume. With Prof. Poulton we "look forward to the time when any description of colour and marking will be considered incomplete unless supplemented by an account of their meaning and importance in the life of the species."

This volume is illustrated by fifteen beautifully coloured plates drawn by Mr. Grönvold.

*Zoological Results based on Material from New Britain, New Guinea, Loyalty Islands, and elsewhere, collected during the Years 1895, 1896, and 1897 by Arthur Willey.* Part VI. Cambridge, 1902. 4to.

WITH the appearance of Part VI. the long and valuable series of reports and articles published as the "Zoological Results" of Dr. Willey's South Sea travels is brought to an end. This part consists of a single work by the explorer himself under the title of "Contributions to the Natural History of the Pearly Nautilus." It is divided into two sections—a "Personal Narrative" of the voyage and a "Special Contribution" on the Nautilus.

The Personal Narrative is good reading from beginning to end,

though the style, racy and picturesque as it is in parts, is in others somewhat strained. Such efforts, for instance, as the description of the result of a blistered back as "a complete ecdysis of the dorsal integument" involve a loss of dignity to the writer. The main object of Dr. Willey's expedition was the investigation of the life-history of the Pearly Nautilus, and in pursuit of this object he took up his abode first in the Gazelle Peninsula at the eastern end of New Britain, and later in New Guinea and at Lifu in the Loyalty Islands. While in New Britain he made a journey to New Ireland and New Hanover, and he gives us some interesting remarks on the habits and customs of the natives of all these places. Scattered through the narrative are also paragraphs on several rare and important animals met with, such as *Peripatus*, *Styeloides*, *Rhodosoma*, *Astrosclera*, and *Ctenoplana*, and these notes are often highly suggestive and interesting. In speaking of the last-mentioned genus, Dr. Willey gives it as his opinion that "the tentacular plane of *Ctenoplana*, about which the aboral ciliated sensory papillæ are disposed in paired groups . . . coincides with the sagittal plane of a bilateral Turbellarian, Nemertine, or Annelid." The eggs of *Nautilus* were at length gotten at Lifu, but proved to be all unfertile. However, as they were very yolky, the value of the development of the young for information on phylogenetic points is considerably discounted.

The Special Contribution on *Nautilus* is a bulky monograph of ninety quarto pages, and discusses, in a series of sections, questions connected with almost every part of the anatomy, physiology, and natural history of the animal. There are, Dr. Willey considers, three species of *Nautilus*—*N. pompilius*, ranging from the Philippines to Fiji, *N. macromphalus*, confined to New Caledonia, where the preceding species is never taken, and *N. umbilicatus*, taken in Papuan waters, but rare. The anatomical observations seem to have been chiefly made on the first of these species, and relate to a number of interesting points. By injecting fresh specimens information was obtained as to the distribution of the blood-vessels; and among other details it appears that the siphuncle is not, as Owen supposed, supplied by a main artery direct from the heart, but receives merely a secondary and two or three tertiary ramifications from the posterior pallial artery. The central hollow of the siphuncle is not cœlomic, as Haller states, but venous, belonging to the hæmocœle. There are also intra-epidermal blood-spaces in the organ, and the author thinks that these facts throw light on the function of the siphuncle, which, according to him, is a vascular appendix employed in keeping up the pressure of the gas in the chambers of the shell.

In a section on the tentacles Dr. Willey favours Owen's view of the homology of these structures with the arms of a cuttlefish, rather than that of Valenciennes that they represent suckers. The arms of Cephalopods are, he thinks, homologous with the epipodium of other mollusks and the funnel with the protopodium. The lamelligerous lobes of the infrabuccal organ of the male are,



it is suggested, homologous with the tentaculiferous lobes of the female, and not with her lamelligerous lobe, which represents the peduncle of the organ in the male. In the body of the animal two metamereres are recognized—the *microbranchiate segment*, containing the smaller gill, the outer osphradium, pericardial gland, kidney, and kidney opening, with the generative opening on the right side and the opening of the pear-shaped body on the left; and the *macrobranchiate segment*, containing the greater gill and the inner osphradium, pericardial gland, kidney, and renal opening.

The *Nautilus* will eat freely any kind of animal food, is gregarious and nocturnal, a ground-feeder, and probably breeds in deep water. Captivity appears to interfere with the normal intercourse of the sexes, so that all the eggs laid in the cages in which they were kept proved unfertile. The eggs have a large brown yolk surrounded by viscid, colourless albumen, which accumulates at the poles. They are laid in ridged capsules, within which is an inner capsule.

While it is, of course, greatly to be regretted that Dr. Willey was unable to follow the development of the young of this important type, zoologists will find ample compensation for his want of success in the mass of valuable and interesting matter contained in the six volumes of this series.

*On some Fossils from the Islands of Formosa and Riu-Kiu\** (= Loo Choo). *Journal of the College of Science, Imperial University, Tokyo, Japan*; Vol. XVIII. Article 6, 1902. 23 pages; 4 plates,  $10\frac{1}{4}$  by  $7\frac{1}{2}$  inches. By R. B. NEWTON and R. HOLLAND.

THE geological fact that certain similar kinds of fossils occur at great distances apart on the Earth's surface has received the careful attention of competent naturalists, as indicating that marine conditions must have formerly extended where now either the ocean exists or both land and water constitute the surface. The occurrence of similar species at separate localities may be either in quite contemporaneous groups, or in an analogous succession of strata, not simultaneous, but homotaxial. In either case the types have been persistent, but their habitats have been disturbed by alterations of the levels of land and sea; and the earlier forms are still buried in some unworked area of the world-wide strata.

The finding of *Monotis Hawaii*, of probably Permian or Permian-Triassic age (page 4), in Formosa is a striking instance of the occurrence of an isolated remnant of an ancient geological formation, like the existence in both Europe and India, and even in America, of portions of the same great formation. Strata of later date (Cretaceous and Tertiary) have been traced at intervals as still existing patches and ranges elevated above the sea-level. Thus the great Nummulitic Formation has left its western extremity recognizable as shallow-

\* Equivalent to the "Loo-Choo" of modern maps. It is not spelt thus in the Monograph, but as Riū-Kiū and Riū-Kiū.

water deposits in the Bracklesham beds of England, and its deep-sea limestones in Europe, North Africa, and India, and other deposits in the Eastern Archipelago. It is to this last area that Messrs. Newton and Holland's work refers, where the above-mentioned Lower Tertiary formation is succeeded by the Middle and Upper Tertiaries.

The special localities yielding the fossils here described are:—

LIMESTONE; IRIOMOTÉ ISLAND, YAYEYAMA GROUP, RIŪ KIŪ.

*Foraminifera.*

Miliolina, 1 sp.

Amphistegina, 1 sp.

Carpenteria, 1 sp.

Linderina?, 1 sp.

Orbitoides (Lepidocyclina), 3 spp.

*Bryozoa (Polyzoa).*

Cellepora, 2 spp. (1 sp. in the Formosan limestone).

*Plantæ.*

Lithothamnium, 2 spp. (also in the Formosan limestone).

RAISED CORAL-REEFS.

*Foraminifera.*

Operculina, 1 sp. Tokuno-shima and Okino-yerabu, and Unten, west coast of Okinawa.

—, 1 var. Itoman, Southern Okinawa.

Pulvinulina, 1 sp. Tokuno-shima, Unten, and Motubu.

The fossil species are mainly of Miocene age, according to the European standard, but some appear to belong to a Pliocene or even Pleistocene stage. Their distribution is carefully indicated for the Eastern Archipelago, Oceania, and Japan.

Notes on earlier information published about some fossils collected by previous observers are given in the Introduction (pages 1–5).

A list of books and papers that have treated of the subject and a tabular statement of the specific determinations make the monograph more complete.

Four quarto plates give twenty-two photographs of illustrative figures and sections of the microzoa under notice; and, though somewhat coarse and indistinct, they give the general aspect of the specimens, and are useful to the student who knows what to look for in the minute structure of the shells.

It should be noticed that the specimens were communicated by Japanese savants, and that the letterpress of the monograph has been well printed by the Japanese in Tokyo.

*Birds in the Garden.* By GRANVILLE SHARPE, M.A. With 105 illustrations, including eight photogravures. London: J. M. Dent & Co., 1902.

THE author of this interesting little volume assures us that he is neither photographer nor ornithologist; nevertheless, we venture to

think, he will probably create a conviction in the minds of most of his readers that he is both !

Only a few of the commonest birds have been described—four species of Titmice, the Spotted or Pied Flycatcher, the Robin, the Chaffinch, and the Willow-Wren; but the habits of these birds, and their varying moods, appear to have been closely observed, and are set forth in a pleasant and chatty manner.

Of the numerous photographs here reproduced the majority are excellent. Here and there, however, one receives a shock, some extremely indifferent pictures having been allowed to see the light. Two or three of the photogravures are really beautiful.

The book is tastefully bound, well printed, and would make an admirable gift for young people.

*The Gross Anatomy of Limnæa emarginata, Say, var. Mighelsi, Binney.* By FRANK COLLINS BAKER. *Bull. Chicago Acad. Sci.* ii. pp. 189-211, with 6 plates. 1st June, 1900.

THIS is a very detailed account of this freshwater mollusk, based on a large number of specimens from various localities in Maine. Detailed measurements of thirty-six shells are given, and two plates show the range of variation in shells, both of its normal form and of the variety *Mighelsi*. The anatomical details are fully described and figured, and compared with those of five other species of *Limnæa*. There does not appear to be any great difference, the chief novelty being the existence of two lateral blood-vessels of the œsophagus and intestine, instead of the one that is usually shown in the figures of other species. The plates are well drawn in black and white, and offer a stock of information most useful for further comparisons.

*Memoirs of the Geological Survey of India. Palæontologia Indica, being Figures and Descriptions of the Organic Remains procured during the progress of the Geological Survey of India.* New Series. Vol. II. Part 1. *Observations sur quelques Plantes Fossiles des Lower Gondwanas.* Planches I.-VII. Par R. ZEILLER, Ingénieur en chef des Mines, &c., &c. Pages (i-ii not numbered) 1-40. Folio. Geol. Survey Office, Calcutta. Kegan Paul & Co., London.

THE fossil plants submitted by C. L. Griesbach and R. D. Oldham to Professor R. Zeiller for his critical examination, and here described and illustrated, have been collected at various places in the Peninsular Coalfields of India since the publication of Dr. O. Feistmantel's grand work on the Fossil Flora of the Gondwana System (*Palæont. Indica*, ser. xii. vol. iv. part 2, 1886). The *Pal. Ind. Memoirs* especially containing his account of the fossil plants from Talchir, Damuda, South Rewah, and elsewhere in Western

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Bengal, are published in the Series XII. vol. iii. parts 1, 2, 3 (1879-1881), with 80 plates, and vol. iv. parts 1 and 2 (1882-1886), with 35 plates.

The plant-remains sent to Prof. Zeiller for examination numbered about 350 specimens, and, although for the most part referable to species already known, they supplied various useful indications of form and structure, especially for seven new species (including one new genus), thus adding nearly 10 per cent. to the 77 species instituted by Feistmantel for the Lower Gondwana. The new forms are:—

*Glossopteris tortuosa*, p. 14.

*Schizoneura Wardi*, p. 27.

*Phyllothea Griesbachii*, p. 30.

*Cycadites* (?), sp., p. 33.

*Feistmantellia bengalensis*, gen. et sp. n., p. 36.

*Araucarites Oldhami*, p. 36.

*Cardiocarpus indicus*, p. 37.

Professor Zeiller, moreover, offers some new and important observations on *Vertebraria* as the rhizome of *Glossopteris* (pp. 17-24) and on the specific identity of *Gl. indica* and *Gl. communis* (pp. 8-12).

At pages 2 and 3 there is a list of localities, not mentioned by Feistmantel, from which Lower Gondwana fossils have been recently procured. Among these is the locality of Reohel in the basin of South Rewah, re-examined by Mr. R. D. Oldham, and where, in the Damuda series, he procured, besides other specimens, a very fine example of *Glossopteris indica*, consisting of a bunch of fronds still attached to a fragment of *Vertebraria*; and of this he gave a figure in the Records Geol. Surv. India, 1897.

In 1861 Sir Charles Bumbury suggested that *Vertebraria* may have been the root of *Phyllothea*. Dr. Feistmantel and others (to 1887) made little progress in its elucidation beyond referring to it doubtfully as an Equisetaceous rhizome (see Mem. Geol. Survey New South Wales, 1890, p. 87). In 1896, however, Prof. Zeiller was able to figure and describe the relation of some fronds of *Glossopteris Browniana* to the transverse joints of a *Vertebraria* in a specimen from South Africa (Compt. Rend. Acad. Sci. vol. cxxii. pp. 744, 745; and Bull. Soc. Géol. France, vol. xxiv. pp. 351-362, pl. xv. figs. 1-9). He states also, at p. 17, that in the Exposition Universelle at Paris in 1900 there was an analogous specimen from the Transvaal, namely a bunch of large fronds of *Glossopteris indica* at the end of a long piece of *Vertebraria*. Thus, he adds, there can be no doubt of the natural attachment of the fronds to the rhizome, but the constitution of the latter and the interpretation of its imprints are not quite clear.

At pages 4-6 is a list of localities that have been mentioned by Feistmantel, and in which other species of fossil plants have been



found besides those observed by him. At pages 6–39 follow descriptions of 13 (?) species:—I. Ferns: *Sphenopteris*, 1; *Glossopteris*, 4, including *Vertebraria*. II. Uncertain: *Dictyopteridium*, 1. III. Equisetinæ: *Schizoneura*, 2; *Phyllothea*, 1. IV. Corditæ: *Noeggerrathiopsis*, 1. V. Cycadinæ: *Cycadites*, 1; *Salisburyæ*, ?; *Feistmantella*, 1. VI. Coniferæ: *Araucarites*, 1. VII. Seeds of Gymnosperms: *Cardiocarpus*, 2; *Voltzia*, ?.

An alphabetical list of 43 species described or cited in the present memoir, with their localities, is given at page 40.

## MISCELLANEOUS.

### *Cyclops rubellus*, Lilljeborg.

*To the Editors of the 'Annals and Magazine of Natural History.'*

GENTLEMEN,—On 2nd May, 1901, my father and I found in Loughrigg Tarn, near Windermere, several specimens of a small *Cyclops* which, though closely resembling both *C. bicolor* and *C. varicans*, differed from both in certain well-marked particulars. We found ourselves unable to refer our specimens to any known British species; but when Professor Lilljeborg's work on the Swedish Cladocera was published and came into our possession, we were able at once to identify them with *C. rubellus*, which is intermediate between the two above-named species. We wrote to Professor Lilljeborg on the subject, and he kindly sent us specimens to compare with our own, thereby enabling us to put the identity of our British specimens beyond question. We have therefore to add the name of *Cyclops rubellus*, Lilljeborg, to the list of the British Entomostraca.

The following is abridged from our translation of Professor Lilljeborg's description, which he has kindly revised:—

"The female varies from .6 to .9 millim. in length. It appears somewhat thick-set, having an ovate, moderately broad cephalothorax, though the abdomen is comparatively slender. The first thoracic segment is longer than the abdomen without the apical bristles. The fifth thoracic segment bears on each side a rather large bristle, directed backwards. The abdomen is slightly more than half the length of the cephalothorax, and its first segment is equal to the three following taken together. The stylets are short and broad, set closely together, and very slightly divergent. Their length is about equal to the distance between the hinder margin of the last abdominal segment and the middle of the last segment but one. The bristle on the outer margin of each stylet is small and is situated about three quarters of the way down. The outermost apical bristle is moderately stout, and shorter than the innermost

one. The inner of the two intermediate apical bristles is considerably longer than the outer and usually rather longer than the abdomen. The lateral bristles (or cilia) on the proximal parts of these bristles are short and thin. The anterior antennae when laid back do not reach the hinder margin of the first thoracic segment. In old and large specimens they contain twelve joints, and in smaller and younger but clearly mature specimens ten or eleven joints. The feet of the first four pairs have two-jointed branches. In the first pair the second joint of the outer branch has on the outer margin three spines and on the inner three bristles, and at the tip two terminal bristles. In the second and third pairs this joint has three spines and four bristles and a terminal bristle and spine, and in the fourth pair two spines and four bristles and a terminal bristle and spine. The fifth foot consists only of a very small rod-shaped joint, which has at the tip a small bristle.

"The male is decidedly smaller than the female. Its length without the apical bristles is from .52 to .74 millim. It is somewhat slenderer than the female and has, like it, a comparatively long first thoracic segment, which is slightly longer than the abdomen without the apical bristles. The stylets are somewhat shorter than in the female and are about the same length as the two last very short abdominal segments taken together. The anterior antennae have fourteen or fifteen joints, and have on the basal joint two pairs of long, narrow, cylindrical, blunt, and papillated so-called 'sensory' clubs.

"Both sexes are more or less reddish in colour, though subject to variation, being darker or lighter or inclined to greyish red. The cephalothorax is usually lighter than the abdomen. The egg-clusters are narrow and generally contain six to eight eggs.

"This species is found sporadically throughout Sweden, but is not common. It occurs for the most part only in small bogs, but is sometimes also found near the shores of large pools. It is a bottom form. It resembles *C. varicans* in its movements."

The above description applies exactly to our British specimens, save that in the latter (1) the first thoracic segment is not "longer than the abdomen without the apical bristles," but slightly shorter; and (2) the side bristle on the stylet is situated about two thirds instead of three quarters of the way down. Our mature female specimens were about .70 or .75 millim. in size and their antennae contained eleven joints. We found no males.

I am,

Yours faithfully,

BEATRICE SPRAGUE.

29 Buckingham Terrace,  
Edinburgh.  
Nov. 1902.

# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

No. 62. FEBRUARY 1903.

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XVII.—*The Morphology of the Madreporaria*.—IV. *Fissiparous Gemmation*. By J. E. DUERDEN, Ph.D., A.R.C.Sc. (Lond.), Bruce Fellow, Johns Hopkins University.

MOST writers on Madreporarian corals have referred to the occurrence of one or more specially enlarged calices on colonies of which the usual method of vegetative increase is by budding. Thus, while practically all the corallites constituting a colony may display, say, twenty-four septa, arranged in two cycles of twelve each, a comparatively few may be found which are much larger than the others, and contain nearly double the usual number of septa. Very rarely one of the enlarged calices may exhibit some stage in the process of fission. The existence of such cases of fission would seem to justify the conclusion that a single species of coral may reproduce both by gemmation and by fissiparity, at one and the same time.

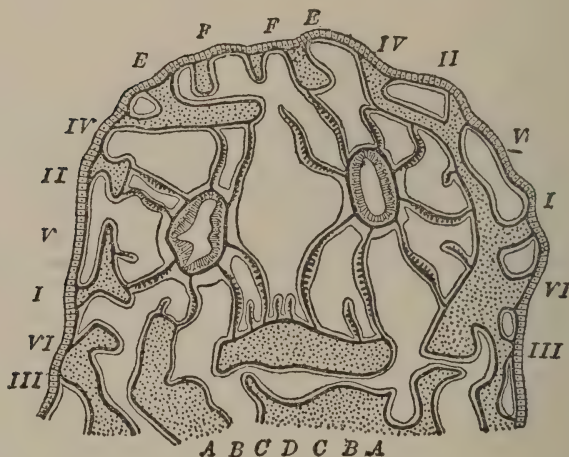
The influence of these isolated cases of fission on the growth of a gemmiferous colony is manifestly very insignificant, and in systematic studies little or no attention is given to their presence, while no attempt has been made to understand their morphological significance. Thus, Mr. H. M. Bernard (1900, p. 491), referring to the claim of Mr. J. J. Quelch that *Porites* possesses twenty-four septa, remarks:—"These, however, are obviously the large double calices, one or two

of which can be found on almost any stock and must be regarded as abnormalities." Also, Prof. A. E. Verrill (1901, p. 96), in describing *Orbicella acropora* (Ell. & Sol.), simply states:—"This species occasionally shows certain calices larger than usual, and with more septa. Such calices may subdivide by regular fission, as is the case with the similar unusually large cells in some species of *Porites*, *Madrepora*, *Pocillopora*, &c., in which fission is elsewhere very unusual."

An anatomical study of many enlarged polyps of this character, found on various West-Indian corals, has revealed certain morphological facts bearing upon the more general subject of asexual reproduction in corals.

In a former paper (1902), I have fully described the peculiar method of growth of the enlarged polyps in the

Fig. 1.



Transverse section through the stomodæal region of an enlarged, bioral polyp of *Madrepora muricata*, Linn. Two stomodæa occur, each with the mesenteries arranged as in an ordinary simple polyp of *Madrepora*. The primary six pairs of mesenteries are indicated by the Roman numerals I-VI, and the six later pairs by the letters A-F; mesenteries III, A and IV, E on each side are directives.

porose genera *Acropora* (*Madrepora*) and *Porites*, and have shown how the process of simple fission there takes place. The figure of a section of a double polyp of *Madrepora* is again introduced, to illustrate the conditions under which the phenomenon occurs in that genus (fig. 1). In the stages



leading up to that represented, it was found that new bilateral pairs of mesenteries are added within the two directive entocoels of an ordinary polyp, provided with only the six pairs of primary mesenteries. The new mesenteries are established in complete or incomplete pairs, in such a manner that when six additional pairs are fully formed the twelve mesenteries on each side of the enlarged polyp are arranged as in an ordinary polyp of *Madrepora*, including the presence of two pairs of directives. The stomodæal tube being also divided all the way, it is clear that when the two moieties of the enlarged polyp eventually separate, along the median plane, each will exactly resemble the original parent polyp, as it appeared before any additional mesenteries were formed. Very rarely, one of the fission-polyps may contain more than the usual six pairs of mesenteries, while the other will be quite normal.

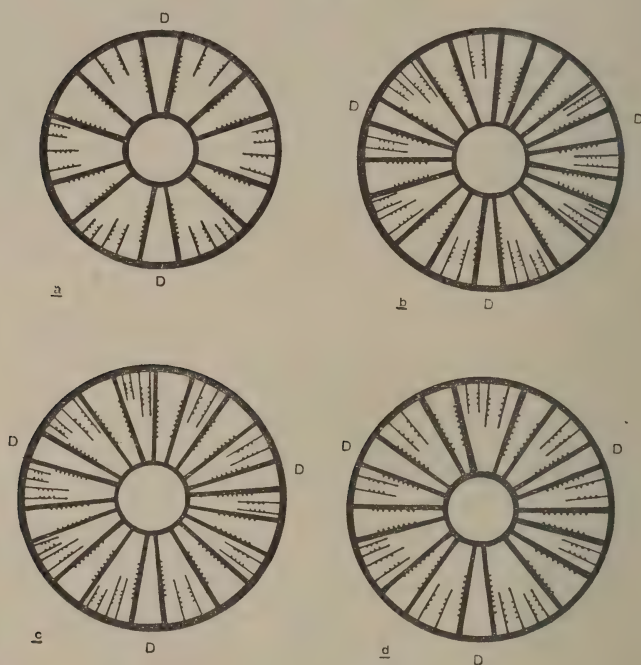
The final product has been found to be the same in the enlarged polyps of *Porites*, but, in any individual polyp of this genus, the additional six pairs of mesenteries appear successively within only one directive entocoel, which may be either the dorsal or the ventral extremity. Polyps bearing two oral apertures on a single disk seem very rare on colonies of the West-Indian species of *Porites*, but are more frequent in *Madrepora*.

The fundamental results in the present connexion are as follows:—On any colony of *Acropora* (*Madrepora*) and *Porites*, a few polyps become much larger than the others, by the appearance of new tentacles, mesenteries, and septa beyond the usual number twelve. In general, the new members conform in size and character with the primary tentacles, mesenteries, and septa, and the additions continue until the polyps are practically double the size of the ordinary polyps, and then fission supervenes. The two resultant fission-polyps are exactly like the original, as regards the arrangement and character of the mesenteries and other organs. Half the mesenteries in each polyp are derivatives of the primary polyp, and half are later formations.

Enlarged and fission-polyps of the gemmiferous, imperforate coral, *Cladocora arbuscula* (Lesueur), have also been studied in the same connexion. The polyps of this species usually contain from twelve to eighteen pairs of mesenteries, and double this number of tentacles and septa, disposed practically in two cycles. The mesenteries are arranged as follows:—Six complete primary pairs, including two pairs of directives; six incomplete alternating pairs, forming a second cycle; two to six other pairs, which are still smaller and

represent only a part of a third cycle. A section of a polyp of *Cladocora*, with sixteen pairs of mesenteries, is represented diagrammatically in fig. 2 *a*.

Fig. 2.



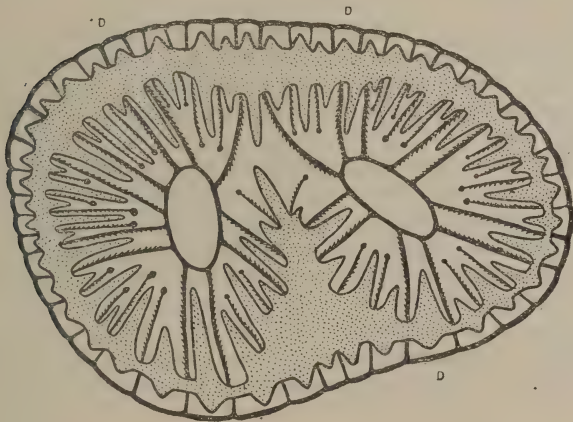
Diagrammatic representation of the mesenterial arrangement in four different polyps of *Cladocora arbuscula* (Les.). *a*, as found in most mature polyps of a colony; *b-d*, as met with in three enlarged polyps. In the enlarged polyps, many pairs of mesenteries have been added to the first and second cycles, including an additional pair of directives (D), but no new cycles or orders of mesenteries are formed.

- Colonies of *C. arbuscula* are sometimes found bearing one or more polyps in which the tentacles, mesenteries, and septa greatly exceed the numbers just given; while now and again an enlarged polyp occurs with two oral apertures on a single disk, surrounded by a single system of tentacles.

The mesenterial plan of three of the enlarged polyps is diagrammatically represented in fig. 2 (*b-d*). In all three polyps, the usual hexamerous plan of the mesenteries is altogether departed from. Irregular numbers of mesenterial

pairs, including an additional pair of directives (D), are united with the stomodæum; the corresponding additional pairs of alternating second-cycle mesenteries also occur, and a comparatively small number of third-cycle mesenteries. The exact order followed in the appearance of the mesenterial pairs beyond those present in fig. 2 *a* has not been established; the different polyps seem to show very diverse arrangements. From the details available, it is not certain which are the primary directives, and which the new pairs. It will be observed, however, that all the new pairs arise as isocnemic unilateral pairs, not as bilateral pairs, which is the manner already shown to be characteristic of *Madrepora* and *Porites*. The most important fact is that the additional mesenteries are not arranged so as to add to the number of cycles originally present, as in the growth of coral and actinian polyps generally, but become constituents of the first, second, and third cycles already established.

Fig. 3.



Transverse section through the stomodæal region of a bioral polyp of *C. arbuscula* having only a single system of tentacles and a single column-wall. The polyp is in process of fission in a median entocœlic plane, and when completed the mesenterial arrangement of each polyp will closely resemble that of an ordinary bud-polyp like fig. 2 *a*.

A transverse section through the stomodæal region of an enlarged polyp of *Cladocora*, which has undergone partial fission, is represented in fig. 3. In the living polyp, two oral apertures were present on a single disk, and the tentacles

formed only a single system. At the low scale of magnification at which the section was drawn, most of the details could be only diagrammatically displayed; two stomodæa are present, and with each is associated nearly the same number of mesenteries as occurs in ordinary polyps, including two pairs of directive mesenteries. The plane of fission is included within the entocœle of two opposite mesenterial pairs. Manifestly, if the two daughter polyps were to become completely separated from one another, they would differ in no material respect from one of the ordinary polyps of *Cladocora*, produced in the usual manner by budding, or directly from the larva. The cyclical hexamerous plan of the mesenteries would be preserved, and two pairs of directives would be present in each.

The mesenterial conditions represented by fig. 2 (*b-d*) are clearly stages toward the establishment of a double series of mesenteries, including also two additional pairs of directives. When this is reached, fission of the stomodæum takes place, and practically half the total mesenteries, along with two pairs of directives, are associated with each moiety.

The results attained by simple fission in *Cladocora* are thus the same as in *Madrepora* and *Porites*. The two moieties are to all intents and purposes new individual polyps, corresponding in every way with polyps originating as buds or from larvæ.

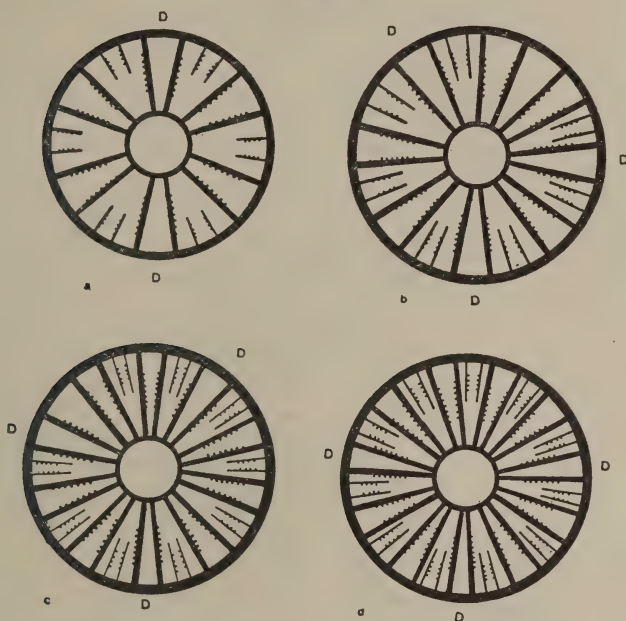
Though not quite so complete, similar results have been obtained from the enlarged polyps on colonies of *Stephanocœnia intersepta* (Esper), *Solenastræa hyades* (Dana), and *Oculina diffusa*, Lamarck. On any colony of *Stephanocœnia intersepta* most of the polyps contain only six complete pairs of mesenteries and six alternating incomplete pairs, forming two cycles, as shown in fig. 4 *a*. In fig. 4 (*b-d*) the mesenterial plan of three enlarged polyps is represented diagrammatically. In these many new mesenteries have been added, yet without increasing the number of cycles; the mesenteries throughout are in complete and incomplete alternating pairs, except in one or two places where an incomplete pair is wanting. Among the new pairs of mesenteries an additional pair of directives (D) has appeared in each case. On macerated coralla the septa are also arranged in two alternating cycles, larger and smaller, alike in both normal and enlarged corallites.

Amongst the preserved material of *S. intersepta* at present available, I can find no example of an actual bioral polyp, or of one undergoing fission. The characteristics of the enlarged polyps, however, are so closely comparable with those of



*Cladocora arbuscula*, already described, that undoubtedly they possess the same significance—that is, they are polyps whose exceptional enlargement will ultimately result in fission. When this is reached, the two daughter polyps will be each provided with two pairs of directives, and exactly resemble bud-polyps in their cyclical and hexameral regularity.

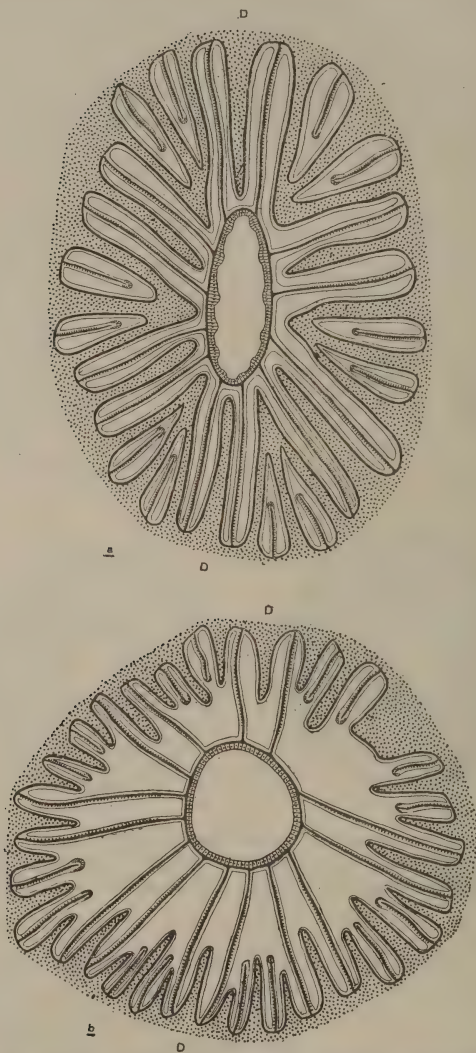
Fig. 4.



Diagrammatic representation of the mesenterial arrangement in four different polyps of *Stephanocœnia intersepta* (Esper). *a*, as found in most mature polyps of a colony; *b-d*, as met with in three enlarged polyps.

A transverse section through the lower stomodæal region of a retracted polyp of *Solenastræa hyades* (Dana) is represented somewhat diagrammatically in fig. 5 *a*. Six pairs of mesenteries, including a pair of directives at opposite extremities, extend as far as the stomodæum, and six alternating pairs are incomplete, and constitute a second cycle. The septal invaginations—entocœlic and exocœlic—are also displayed, and at this level they are grouped in threes, by the union of the entoseptum within each pair of the second cycle mesenteries with the adjoining exosepta—one on each

Fig. 5.



Mesenterial and septal arrangement in two polyps of *Solenastrea hyades* (Dana). *a*, as found in most polyps of a colony; *b*, as displayed in an enlarged polyp. In the latter a pair of complete and of incomplete mesenteries have been added on the left side, and a pair of incomplete mesenteries on the right side. The new pairs are not arranged so as to form new cycles.

side. The groups are separated by continuous septa, one within the entocœle of each of the six primary pairs of mesenteries.

The above is the condition of nearly all the polyps on any colony of *S. hyades*, but occasionally examples are found in which the mesenteries have undergone an increase. Such a polyp is represented in fig. 5 *b*. Compared with the previous figure, a pair of complete and of incomplete mesenteries have been added on the left side of the directive axis, and a single pair of incomplete mesenteries on the right side. As before, the additional members conform in size, and relationship with the stomodæum, with the mesenterial pairs already present. Such a simple stage of increase, before a third pair of directives has arisen, serves to demonstrate that new pairs of mesenteries may appear on both sides of the directive axis.

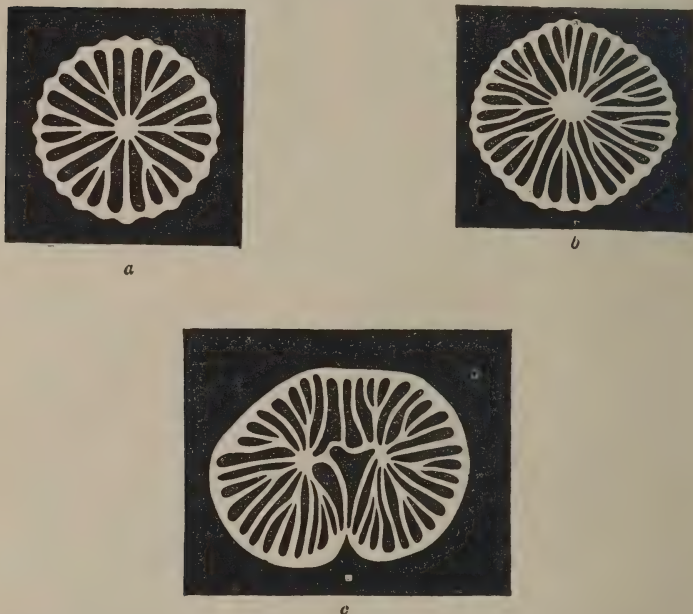
Other enlarged polyps of *S. hyades* have been examined by means of sections, but they merely repeat what has been already established by examination of *Cladocora* and *Stephanocœnia*, as to the manner of increase of the mesenteries. The arrangement of the septa also supports the conclusions gained from the mesenteries.

Figs. 6 *a-c* represent the septal plan of three distinct corallites of *S. hyades*. Fig. 6 *a* shows the number and arrangement of the septa in nearly all the corallites constituting a colony. Twenty-four septa occur, arranged in six groups of three, with an alternating continuous septum between any two groups. The condition corresponds with the section of the polyp in fig. 5 *a*. Fig. 6 *b* represents the septa of one of the few enlarged calices. In this thirty-six septa occur in nine groups, and present exactly the same arrangement as in the normal corallites with twenty-four septa. With the increase in the number of septa, no additional cycles are developed, thus differing from the plan generally followed in corals. Fig. 6 *c* shows a calice with forty-three septa, nearly double the number characteristic of most corallites. Here the tricyclic character of the septa is still retained, and fission is evidently in progress. When the process is completed, and the remaining five septa necessary to complete the grouping in threes are formed, each moiety will exactly resemble one of the ordinary calices. No corallite of *S. hyades* has been found in which more than forty-eight septa occur, thus showing that the septal increase is not continued indefinitely, but only until the normal number of septa is doubled.

The details, as to the mesenterial arrangement, occurring in the enlarged and bioral polyps of *Oculina diffusa*, are so

closely similar to those obtained from the three preceding species that it is unnecessary to repeat them. In every case the mesenteries above the usual number—twelve pairs in two cycles—are arranged in conformity with the first and second cycles, not in new cycles; and fission separates an enlarged polyp into two halves, each with twelve pairs of mesenteries, in every way recalling ordinary bud-polyps.

Fig. 6.



Septal arrangement in three different calices of *Solenastrea hyades*. *a*, as met with in most calices; *b*, an enlarged calix; *c*, a calix in process of fission. In *b* and *c* the septa are arranged on the same plan as in *a*; in *c* the septa are nearly double in number those present in an ordinary calix, so that when fission is completed each half will represent a new calix.

Thus in fission of the enlarged polyps of three gemmiferous genera—*Acropora* (*Madrepora*), *Porites*, and *Cladocora*—it is manifest that the resulting polyps are in every way comparable with polyps produced by ordinary budding; these, in their turn, by the presence of directives and the retention of the hexamerous cyclic plan, resemble larval polyps.



The mesenterial and septal conditions met with in the enlarged polyps of *Stephanocænia*, *Solenastræa*, and *Oculina* practically prove the same for these gemmiferous genera. In all six genera, the addition of new mesenteries and septa, beyond those characteristic of the species, does not lead to an increase in the number of hexamerous cycles or orders, but merely to an increase in the number of mesenteries and septa belonging to the original cycles. It may therefore be assumed that this is characteristic of the enlarged polyps of gemmiferous corals generally, and, further, that the products of simple fission are truly bud-polyps.

The products of simple fission, in species which are normally gemmiferous, may be now contrasted with those found in corals where fission is the usual method of vegetative growth, and where budding seems to be unknown. In the third paper of this series (1902<sup>a</sup>), I have given an account of the early stages of fission in *Manicina areolata* (Linn.) and *Favia fragum* (Esper), and compared the results from these two familiar corals with the characteristics of other species of fissiparous corals, such as *Mæandrina labyrinthica* (Ell. & Sol.). It is there shown that the larval polyps of *Manicina* and *Favia* develop according to the normal Hexactinian plan for some time, and that the first fission-plane divides the young polyp into practically equal halves, in an entocœlic plane at right angles to the directive plane or principal axis of the polyp. The hexamerous cyclical plan may or may not be preserved in each moiety, but only one pair of directives is present in each. Manifestly, therefore, the products of fission are from the beginning different from those in *Madrepora*, *Porites*, *Cladocora*, and others where two pairs of directives occur.

Fission continues in *Manicina* and its allies, and the mesenteries become grouped in complete or incomplete isocnemic pairs around numerous stomodæa, but soon lose all their hexamerous and most of their cyclical regularity; and, further, no additions are ever made to the two primary pairs of directives. The products of fission in normally fissiparous genera are not new polyps in the same sense as are bud-polyps; they are devoid of directives, and without any hexamerous cyclical regularity. Fission-polyps are more to be regarded as fragments isolated from a complex large polyp than as separate individuals. Morphologically, a sharp line of distinction is established between polypal fission and budding, though such is not generally recognized by students concerned with the skeleton only.

Polypal fission, as represented in the enlarged polyps of

*Madrepora*, *Porites*, *Cladocora*, *Stephanocænia*, &c., is therefore not comparable with fission as manifested in normally fissiparous genera, like *Manicina*, *Favia*, *Mæandrina*, &c. Fission in the former gives rise to new individual polyps, just as truly as in the more usual method of budding; while in the latter fission does not produce new polyps, but merely a complex multioral condition of the primary larval polyp. In gemmiferous genera the process is not a division into two of a simple hexamerous polyp, as in the first division of *Manicina*, &c., but the separation of the constituents of two individual polyps which have grown together, one much later than the other. Evidently the term fission cannot be applied in the same sense to the two processes, for morphologically the results are altogether different. The term is best retained for the conditions met with in *Manicina*, *Favia*, and their allies.

In what manner, then, should the phenomenon of apparently simple fission in gemmiferous colonies be conceived? Though all the stages in proof thereof are not yet forthcoming, a consideration of the facts presented leads to the conviction that it is best understood as a specialized form of budding, and the entire process may be regarded as fissiparous gemmation.

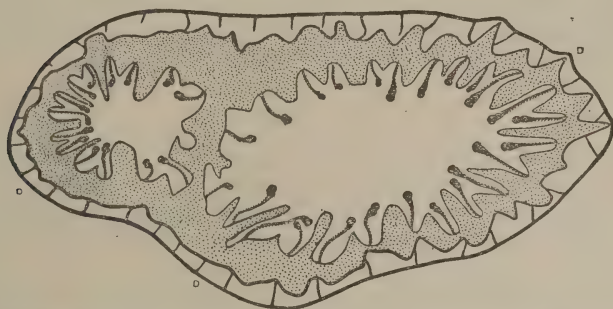
In most species of gemmiferous corals the buds arise on the polypal wall, within fairly definite limits, which are characteristic of the species. Thus, in the branching *Madrepora*, buds appear mainly on the cœnosarc, a little below the apical polyps; in *Porites*, *Stephanocænia*, and *Solenastræa* they are intercalary in position—that is, arise at the point of union of two or more adult polyps; in *Cladocora* buds are developed toward the upper part of the column-wall of individual polyps; while in *Oculina* they arise in a spiral manner, close together at the apex of the branches, and become wider apart below.

Though the above distribution of the buds seems fairly constant for the particular species studied, there is no reason to suppose that it is invariably followed; rather, I conceive that gemmation may occasionally take place at almost any part of the free polypal wall, from the disk as well as from the column-wall; and, if within the disk, then also around the oral aperture. In this last case the one mouth and stomodæum would be common to the bud and the parent; the mesenteries of the one would intermingle with those of the other; two additional pairs of directives would be developed, as in all other buds; and the mesenteries as a whole would have the same ordinal and cyclic value as in buds arising on the column-wall. When the bud reaches its full

size, it will tend to separate from its parent, and in so doing it will appear as if an enlarged polyp were undergoing fission into equal halves, whereas, strictly speaking, it is the components of the bud-polyp separating from the parent body.

In such a specialized form of gemmation, the constituent mesenteries of the bud and parent polyp may be so arranged that division actually involves half of each polyp—that is, half is new formation, and half is old. Such is manifestly what happens in *Porites* and *Madrepora*, where the plane of separation is along the primary directive axis; but in *Cladocora*, *Siderastræa*, &c. the actual distribution of the new and old mesenteries in the two fission-polyps has not been determined.

Fig. 7.



Transverse section through a bial polyp of *Cladocora arbuscula*, below the stomodæal region. The polyp to the left is as yet incompletely developed, and may represent a bud which has developed independently on the disk of another polyp, or a stage in fission beyond that shown in fig. 3.

In no other way than as discal gemmation it seems to me can one account for the occurrence of two oral apertures, two stomodæa, and two Hexactinian systems of mesenteries within a single system of tentacles and a single column-wall. In discal gemmation the division of the stomodæum has not the same significance as in true fissiparity. It is rather a separation of two distinct stomodæa, one belonging to the parent and one to the bud; whereas, in true fission, it is the division of an enlarged stomodæum into halves, and neither represents a distinct individual.

Some of the enlarged bial polyps of *Cladocora arbuscula* seem to afford evidence that discal gemmation may occur

without involving the parent stomodæum—that is, a bud may appear on the oral disk, and from the beginning remain as a distinct individual, as regards its mesenteries and stomodæum, just as in the case of buds arising on the column-wall. In the partly diagrammatic representation of a transverse section of a bioral polyp of *C. arbuscula*, given in fig. 7, two apparently distinct polyps are enclosed within one column-wall, which was terminated by a single system of tentacles. The larger polyp to the right is normally hexamerous, with two pairs of directives, while the smaller to the left is still imperfect, and on its inner side is wanting a pair of directives.

I regard the small polyp as a bud which has arisen on the disk of the larger polyp, but, on account of its closeness to the parent polyp on the inner side, the development of the mesenteries has not proceeded symmetrically. It must be admitted, however, that it is difficult to distinguish between a new mesenterial system arising independently on the disk of another polyp, and one which has developed as an integral part of a polyp, and been pinched off later.

### Summary.

a. The polyps in Madreporaria which arise asexually by budding are new individuals, with all the characteristics of hexamerous cyclical polyps reared directly from larvæ; whereas in asexual reproduction by continuous fission no new polyps are ever formed.

b. On any gemmiferous colony a few polyps frequently occur which are much larger than the usual adult form. The additional mesenteries and septa of these, as observed in the genera *Porites*, *Madrepora*, *Cladocora*, *Stephanocænia*, *Solenastræa*, and *Oculina*, do not continue the hexamerous cyclic plan of the polyp, but conform in character with the mesenteries and septa already present, and include one or two additional pairs of directives.

c. In *Madrepora* and *Porites* the new mesenteries arise as complete or incomplete bilateral pairs within one or both of the directive entocœles; but in *Cladocora*, *Stephanocænia*, *Solenastræa*, and *Oculina* they arise as unilateral isocnemic pairs within one or more exocœlic chambers.

d. Fission of the enlarged polyps takes place in such a way that each of the two moieties resembles an ordinary bud or larval polyp; each conforms with the hexamerous plan, and is provided with two pairs of directives.

e. Fission in gemmiferous corals is morphologically distinct from the same process in fissiparous corals, for in the latter



the products of fission never resemble bud or larval polyps. The first seems best understood as a modified form of budding, the organs of the bud having come into intimate association with those of the parent polyp, so that separation of the two involves the division of the mouth, stomodæum, disk, and tentacular system (fissiparous gemmation).

f. Apparently true discal gemmation may take place in species which usually reproduce by columnar budding.

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## XVIII.—*New and little-known American Coccidæ.*

By T. D. A. COCKERELL.

### CARDIOCOCCUS, gen. nov.

A Lecaniine Coccil allied to *Inglisia* &c.; legs and antennæ small or rudimentary; insect covered by a brittle waxy scale, with a dorsal pit or foramen.

Type *C. umbonatus*.

### *Cardiococcus umbonatus*, sp. n.

♀.—About 2 millim. long, covered with white waxy secretion, elevated; low-conical as seen from the side, with numerous longitudinal striæ; nearly round as seen from above, with a large and deep central pit, the waxy secretion radiating from two contiguous rounded umbones, the whole shaped like the shell of the genus *Hemicardium*. No lateral fringe. The wax is rather opaque; the longitudinal (vertical) grooves are minutely cross-grooved, but I cannot see any definite air-cells. Denuded insect very shiny, dark brown, more or less vertically striated. Removed from the twig, the female leaves a dense white waxy pad. Legs and antennæ

present, but rudimentary; antennæ about  $90\ \mu$  long, slender, obscurely jointed, with a very blunt bristly tip. Legs dark ferruginous, not very stout, anterior leg with tibia+tarsus about  $100\ \mu$  long; hind leg with femur+trochanter  $90\ \mu$ ; tibia+tarsus  $120\ \mu$ . Skin orange-ferruginous, not clearing upon boiling, obscurely tessellated, the tesserae about  $15\ \mu$  diameter. Margin thickened, with a very few small simple bristles and quite numerous very small (about  $7\ \mu$  long) spear-head shaped spines. Near the margin are many large gland-pits. There is a distinct median longitudinal groove and also a large oval dorsal opening corresponding to the pit seen in the waxy scale.

*Larva* (after boiling) pale lemon-yellow, about  $375\ \mu$  long and  $180$  broad, tapering posteriorly, with the abdominal segments very well marked. Caudal bristles short, about  $40\ \mu$  long. Legs long (about  $165\ \mu$ ), digitules filiform, knobbed; anterior legs with tibia and tarsus about equal ( $42\ \mu$ ); if anything, the tibia is the longer. Antennæ short (hardly  $90\ \mu$ ), last joint with a very long bristle.

♂.—Scales on undersides of leaves, small and narrow, covered with dense waxy secretion, which forms two large dorsal tufts, one curling forwards, the other backwards. There are also irregular lateral nodules. Apical cap placed horizontally.

♂.—Pale yellow; wings iridescent.

*Hab.* Zapotlan, Jalisco, Mexico, on twigs of wild guava, July 6, 1902 (*C. H. T. Townsend*).

To this genus I must also refer two Australian species, *Cardiococcus fossilis* (*Inglisia fossilis*, Maskell, N. Z. Trans. xxix. p. 308) and *C. foraminifer* (*I. foraminifer*, Maskell, N. Z. Trans. xxv. p. 213). They have the dorsal pit and the conical spines so characteristic of *C. umbonatus*.

#### *Ceroplastes mexicanus*, Ckll.

Zapotlan, Mexico, July 7, on a composite near *Parthenium*; collected by Prof. Townsend.

Adults are  $5\frac{1}{2}$  millim. long,  $5$  broad,  $4$  high. Immature examples are  $3$  millim. long,  $2\frac{1}{4}$  broad,  $1\frac{3}{8}$  high, dull white, the plates indicated by grooves, but not at all by colour; dorsal nucleus large, white, surrounded by dark purple-brown; lateral nuclei similarly coloured, but small, all very conspicuous; sometimes a chalky line runs from the lateral nuclei to the margin. Dorsum flat or sloping, not humped.

*Ceroplastes cistudiformis*, Ckll. & Towns., var.

Tonila, Jalisco, Mexico, on plant like *Parthenium*, Aug. 3 (Townsend).

Possibly a distinct species, but there is only one adult female. Closely allied is *C. variegatus*, Hempel. These species have a distinct dorsal hump.

*Ceroplastes irregularis*, Ckll.

El Paso, Texas, on *Atriplex*, May 26 (Townsend).

*Ceroplastes roseatus*, Towns. & Ckll., var.  $\beta$ .

♀.—Scales 8 millim. long, 7 broad, 5 high, dull yellowish white with a rosy tint, with two chalky spots on each lateral margin, but no lines; apex pointed as described by Dolby-Tyler; denuded female very dark, hemispherical, length (not counting horn) 5 millim., breadth  $4\frac{1}{2}$ , height  $3\frac{1}{2}$ . Caudal horn sharp, directed backwards and slightly upwards; back rounded, with only a small obtuse prominence, lateral nuclear prominences small.

Skin after boiling ferruginous, with very numerous round to suboval gland-orifices, about  $10\ \mu$  diameter, and minutely reticulated patches as in allied species. Diameter of mouth-parts  $150\ \mu$ . Caudal horn conical, about  $1450\ \mu$  long and 1000 broad at base, very dark coloured. Margin with short broad spines about  $12\ \mu$  long. Legs with femur + trochanter  $210\ \mu$  (width of femur 57), tibia 129, tarsus 87. Antennæ about  $330\ \mu$  long, 7-jointed, with a long 4th joint; joint 2 short, 3 about  $48\ \mu$ , 4 about 105, 5 is 24–27, 6 is 24, and 7 is 40–48  $\mu$ .

*Hab.* Base of Volcan de Colima, Mexico, on stems of a tall herbaceous composite, Aug. 3, alt. about 7000 feet (Townsend).

*Ceroplastes brachyurus*, sp. n.

♀.—Scale convex, long.  $2\frac{3}{4}$ , lat.  $2\frac{3}{4}$ , alt. 2 millim.; irregular, with rounded prominences; wax dull white, stained with pink at the sides; two very conspicuous lines of chalk-white secretion on each side, close together. The lateral margins are swollen and the dorsal nucleus is more or less depressed. Denuded female, long.  $2\frac{1}{2}$ , lat. 2, alt.  $1\frac{3}{4}$  millim., rounded, very convex, very shiny, ferruginous; caudal horn extremely small; a small but distinct dorsal knob. Skin after boiling brownish, semitransparent, mostly free from glands; antennæ about  $180\ \mu$  long, 7-jointed, with a long 4th joint;

joints measuring in  $\mu$ : (1) ring-like, (2) 21-27, (3) 33, (4) 45, (5) 18, (6) 16-18, (7) 24-27. Breadth of mouth-parts about 130  $\mu$ . Anterior legs with femur+trochanter 100  $\mu$  (width of femur 30), tibia 78, tarsus 66. The tarsus has a deep constriction near its middle, so that it looks as if 2-jointed. Claw-digitules about 21  $\mu$  long (twice as long as claw), stout, with bulbous base and large knob.

*Larva* about 375  $\mu$  long.

*Hab.* Zapotlan, Mexico, numerous on small branches of shrub with small pinnate leaves like *Rhus*, July 6 (*Townsend*).

This small species has not the wax divided into plates; it reminds one a good deal of *C. albolineatus*, but is much smaller, and the lateral chalky lines are narrower and closer together. The specimens are adult and have produced many young.

*Ceroplastes marmoreus*, sp. n.

♀.—Scale long. 6-6½, lat. 5-6½, alt. 4-5 millim., rounded, wax thick, not divided into plates, white, irregularly suffused and marbled with madder-red; sides bulging below, with two narrow bands of chalk-like secretion. Sometimes the wax of two or more individuals runs together. Denuded female about 3½ millim. long, not very convex, with a dorsal crest and six conspicuous pointed lateral projections; caudal horn very short, pyramidal.

Boiled in KHO the insects impart only a slight reddish stain to the liquid, but they nevertheless contain much madder-red colouring-matter. Skin after boiling yellowish ferruginous, semihyaline, without conspicuous glands. Diameter of mouth-parts 130-140  $\mu$ . Femur+trochanter 108-150  $\mu$ , tibia 70-123, tarsus 40-78; the smaller size refers to the anterior and the larger to the posterior legs. Claw-digitules with rather large knobs. Margin without spines. Anal plates about 90  $\mu$  long and 36 broad, shaped like the elytra of a beetle, and situated near the hind margin of a large subcircular or subtriangular orange-ferruginous chitinous plate (520  $\mu$  diam.), which exhibits many gland-orifices. Antennæ about 270  $\mu$  long, slender, 7-jointed, with a long 4th joint; joint 7 short and blunt, 1 long. Measurements of joints in  $\mu$ : (1) 30-36, (2) 33-40, (3) 45, (4) 75, (5) 23, (6) 24, (7) 27.

*Hab.* Zapotlan, Mexico, on composite near *Parthenium*, July 7 (*Townsend & Boyd*); also on sage and *Catalpa* (*Townsend*).

*C. marmoreus* is easily recognized by its appearance; the



antennæ are almost exactly as in *C. cultus*, Hempel, but that species has thin wax. The specimens described had produced many young.

*Ceroplastes purpurellus*, sp. n.

♀.—Scale  $2\frac{1}{4}$  millim. long, 2 broad,  $1\frac{1}{2}$  high; dull purple-grey, plates indistinctly outlined by slightly darker lines; nuclei white, on large dark brown patches, the dorsal patch covering the whole of the rather obliquely truncate apex. From the lateral nuclei narrow bands of chalk-white secretion run to the margin. The scales vary much in height.

Denuded female rounded, caudal horn distinct and sharp, but very short; dorsum hardly cristate; wax fairly thick. Boiled in KHO the skin becomes yellowish hyaline, mostly without conspicuous glands. Anal plates  $90\ \mu$  long and 42 broad, their outer sides rounded, not sharply angulate. About 17 glands in stigmatic area. Antennæ 7-jointed, first ring-like; joints measuring in  $\mu$ : (1) 12–15, (2) 33, (3) 36–42, (4) 51, (5) 20–24, (6) 18–21, (7) 24. Anterior legs with femur+trochanter  $135\ \mu$  long, tibia 90, tarsus 60, slightly constricted near the middle. Tarsal digitules filiform; claw-digitules with large knobs.

*Hab.* Tonila, Jalisco, Mexico, on a tree 12 feet high, Aug. 2 (Townsend). It occurs on the twigs, and on the same twigs are specimens of *Howardia biclavis* (Comstock).

*C. purpurellus* is allied to *C. brachyurus*, but is easily distinguished by its smaller size, more compact form, and different colour. The examples described had produced young.

*Ceroplastes Townsendi*, Ckll., var. *percrassus*, nov.

♀.—Waxy scale about 16 millim. long, 13 broad, 12 high; wax white, with a faint yellowish tint (not in the least pink), very watery, about  $4\frac{1}{2}$  millim. thick; no division into plates; two chalky stripes on each side beneath, not at all visible on the outside. Denuded female very dark reddish brown, long.  $6\frac{1}{2}$ , lat. 5, alt. 5 millim., not counting the long caudal horn, which is 4 millim. long, black, and only very slightly inclined upwards. The sides have each three short pointed projections, of which the middle ones are the largest; the dorsum is low-pyramidal seen from the side, conical seen from the end, terminating in a distinct though rather blunt process, having the form of a short longitudinal keel. Boiled in KHO the insects colour the liquid dark madder-red. Legs very dark brown; femur+trochanter about  $210\ \mu$  long, tibia

144, tarsus 95; tarsal digitules rather slender, about  $60\ \mu$  long, with rather large knobs; claw-digitules extending beyond claw, rather slender, but with fairly large knobs. The claw-digitules are more or less swollen at the base, as in *C. psidii*. Dorsal skin strongly chitinous, ferruginous, with many mostly oval gland-orifices, about  $15\text{--}30\ \mu$  in diameter. Here and there are large patches of tessellated (honeycomb-like) structure. Antennæ about  $400\ \mu$  long, 6-jointed, with a very long 4th joint, which has a notch near its end. Measurements of joints in  $\mu$ : (1) 36, (2) 63, (3) 60, (4) 126, (5) 32, (6) 72.

*Larvæ* (dried) bright ferruginous.

*Hab.* Zapotlan, Mexico, on small branches and twigs of *Ficus*, July 7 (*Townsend & Boyd*). The specimens were preyed upon by a Phycitid larva. Also collected at Irapuato, Mexico, on oleander and on a yellow-flowered tree with narrow leaves and a milky sap, July 4 (*Townsend*).

Immature specimens are similar to the original *C. Townsendi*, which was not observed to grow to anything like the size of the present insect. It is probable, however, that typical *Townsendi* grows to a larger size than has been observed.

*Ceroplastes albolineatus*, Ckll., var. *vulcanicus*, nov.

♀.—Waxy scale about 14 millim. long,  $11\frac{1}{2}$  broad, 8 high; scales on small branches, often confluent; wax very thick and watery, pale yellowish pink, not divided into plates. A central white nucleus, and on each side a depression, below which is a bulging, upon which the bands of chalky-white secretion are more or less visible, often being very distinct. Within, the wax is decidedly pinkish. Denuded female dark red-brown, flattish,  $5\frac{1}{2}$  millim. long, 4 broad, about 2 high, with a large narrow dorsal crest; the anterior and six lateral processes quite long and sharp-pointed; caudal horn short (about 1 millim.) and directed upwards at an angle of about  $45^\circ$ . Boiled in KHO the skin becomes hyaline, mottled with brown, with numerous scattered small glands, and here and there ill-defined patches of reticulation. The margin is thickened and presents two rows of small, broad, conical spines, hardly constricted basally. Antennæ 7-jointed: joint 1 ring-like, short; 2 very broad at base, with the apical third suddenly narrowed and bearing two bristles, one very long (about  $90\ \mu$ ); 4 has the apical  $10\ \mu$  suddenly constricted, and just before the constriction is a bristle. Measurement of joints in  $\mu$ : (1) ?, (2) 66–70, (3) 68–70, (4) 105–120, (5) 21, (6) 21–24, (7) 36–40. Anterior leg with femur + trochanter

225  $\mu$  long, tibia 162, tarsus 68. Claw strongly curved; claw-digitules extending far beyond claw, rather stout, with dark brown knobs about 8  $\mu$  diameter; tarsal digitules filiform, about 58  $\mu$  long, with distinct knobs about 4  $\mu$  diameter.

*Hab.* Volcan de Colima, Mexico, on low bush under pines, altitude about 7000 feet, Aug. 3 (*Townsend*).

Very likely a distinct species.

*Neolecanium plebeium*, sp. n.

♀.—Scale long.  $5\frac{1}{2}$ , lat. 4, alt. 2 millim., but variable; very dark brown, almost black, rough, with coarsely and closely pitted sides; dorsum smoother, shiny, with sometimes two obscurely indicated blunt longitudinal ridges. Surface of scale spotted with little patches of brownish-white secretion. Dorsal skin yellowish ferruginous (after boiling), with numerous small round gland-orifices of various sizes (diam. 6–15  $\mu$ ). Anal plates ordinary, about 180  $\mu$  long and 93 broad. Mouth-parts dark brown, about 180  $\mu$  diameter. Tracheæ large. Antennæ rudimentary. Margin apparently without spines.

*Larva* ordinary, about 450  $\mu$  long, with 6-jointed antennæ about 120  $\mu$  long.

♂.—Scale glassy, broader than usual, dorsal area narrower than lateral areas.

*Hab.* Colima, Mexico, on bark of "Higuerra" (*Ficus* sp.), July 13 (*Townsend*).

Allied to *N. herrerae*, Ckll.

*Neolecanium manzanillense*, sp. n.

♀.—Scale long. 6, lat.  $4\frac{1}{2}$ , alt. 4 millim., very convex, *Kermes*-like, black or almost so, shiny, roughened all over with small raised points; an irregular, often more or less star-shaped, pale yellowish-brown patch surrounds the anal plates. Sides slightly furrowed, but not plicate. Margin very thick. Younger scales (about  $4\frac{1}{2}$  millim. long) have the sides light brown, with deep furrows separating rounded ridges (about ten such ridges on each side), and the dorsal area convex, varying from light brown to light lemon-yellow. Skin (after boiling) of adult ferruginous, densely crowded with small tubular glands, all about the same size; ventral skin transparent. Spiracles large. Legs and antennæ rudimentary. Claw rather large, digitules well developed. Length of leg about 150  $\mu$ . Diameter of spiracular opening about 120  $\mu$ . Anal plates dark brown, small (about 165  $\mu$  long),

with two or three processes or teeth on the inner border anteriorly, apparently to lock them together; posteriorly the plates each terminate in a chitinous rod, which joins a large chitinous posterior to them. Anal ring oval, with eleven bristles of no great length, placed two at each end, and in the example studied four on one side and five on the other. Margin without spines.

*Larva*.—Mr. G. B. King has prepared the following description of the larva:—When dead and dry elongate-oval, brown; colourless when boiled in KHO. Length 460, breadth 272  $\mu$ . Antennæ 6-jointed, joints measuring in  $\mu$ : (1) 20, (2) 20, (3) 44, (4) 20, (5) 16, (6) 44. Front leg with coxa 48, femur + trochanter 80, tibia 52, tarsus 44, claw 16  $\mu$  long. Marginal spines ordinary, 16  $\mu$  long. Anal lobes prominent, with one long bristle 240  $\mu$  long and two short sharp spines 16  $\mu$  long. Anal ring with six bristles 60  $\mu$  long.

*Hab.* Manzanillo, Mexico, on a leguminous shrub with mimosa-like leaves, infesting the small branches, July 18 (*Townsend*).

*Neolecanium leucænæ*, Ckll.

Zapotlan, Mexico, on *Mimosa*, July 6 (*Townsend*).

The skin is very distinctly minutely reticulated in these examples. The rudimentary antennæ have six ill-defined joints, of which the second and third are largest, and about as broad as long.

*Coccus* [*Lecanium*] *minimus* (Newstead).

Colima, Mexico, on leaves of a fan-palm with a prickly nut, July 30 (*Townsend*).

New to America; doubtless introduced on plants. Females  $2\frac{1}{2}$  millim. long are full of larvæ, which are 315  $\mu$  long. The skin is not properly tessellate, but wrinkled so as to appear so. The only character which does not agree with Newstead's description is the length of the tarsus; I find the first pair of legs with tibia 75, tarsus 51  $\mu$  long. Antennæ 7-jointed, joint 3 always longer than 4. Anal plates 132  $\mu$  long, 75 broad.

*Lichtensia zapotlana*, Ckll., var. *Townsendi*, nov.

♀.—Very dark brown, with glassy covering as in *zapotlana*; remains brown after boiling; ovisac long and narrow, 9 millim. long, 2 broad, more or less longitudinally grooved.



Second joint of antenna 33–42  $\mu$ , third 84–90, fourth 66, fifth 48. Claw-digitules considerably longer than claw, not nearly so broad as in *L. lutea*. Anal ring and plates about as in *L. mimosæ*.

*Hab.* Armeria, Colima, Mexico, on copal, July 19 (Townsend).

*Ceroputo orthezioides*, sp. n.

♀.—Body 2300  $\mu$  long, 1150 broad, covered entirely with white waxy secretion, which has a woolly appearance on the underside, but on the upper is densely felted, with short, broad, hardly separable, lateral lamellæ and a more or less distinct, sharp, mid-dorsal, longitudinal keel. The rostral loop projects forwards instead of backwards, and is seen extending from the deep anterior emargination. The body (not boiled) is perfectly colourless, except that each segment has on each side a large (about 95  $\mu$  diam.), convex, brown patch beset with short (about 15  $\mu$  long) spines. A pair of large air-vessels extend from near the basal tips of the middle coxæ to the ends of the anterior projections of the body, antero-laterad of the antennæ. Anal ring with six very long bristles, about 185  $\mu$  long. Labium 2-jointed, narrow, about 186  $\mu$  long and 96 broad. Legs and antennæ yellowish ferruginous; middle leg with femur + trochanter 414  $\mu$  long (width of femur about 98), tibia 375, tarsus 174, claw 54. Antennæ 8-jointed, joints measuring in  $\mu$ : (1) 60, (2) 78, (3) 129, (4) 90, (5) 81, (6) 84, (7) 84, (8) 90–96. The last joint is very bristly. Claw with a large denticle on inner side.

*Hab.* Irapuato, Mexico, "on roots of dockweed," July 4 (Townsend).

A very peculiar species, with its deep anterior emargination. It looks like an *Orthezia*.

*Ceroputo yuccæ* (Coquillett), var. *ceanothi*, nov.

♀.—Length  $3\frac{1}{4}$ –4 millim.; legs and antennæ dark sepia. Antennæ 9-jointed, joints measuring in  $\mu$ : (1) 90–105, (2) 114–135, (3) 185–195, (4) 147–150, (5) 140–165, (6) 120–126, (7) 108–114, (8) 99–105, (9) 141–150.

*Hab.* Los Angeles County, California, on *Ceanothus oliganthus*, June 9, 1893 (Coquillett).

Differs from typical *yuccæ* in the considerably longer second and fourth joints of antennæ.

*Phenacoccus gossypii*, Twms. & Ckll.,  
var. *psidiarum*, nov.

♀.—On leaves and bark; entirely covered by white cottony sacs about 4 millim. long, not at all waxy in appearance. They look like *Eriococcus*, except that the sacs are more cylindrical, with broadly rounded instead of tapering ends. Boiled in KHO does not stain liquid; eyes large and prominent; skin transparent, colourless, with many small round glands ( $4-5\ \mu$  diam.) and rather numerous bristles, some fully  $105\ \mu$  long. Lateral bristle-patches small. Labium ordinary. Legs and antennæ very pale brownish; legs quite bristly. Claw with the usual denticle on inner side. Femur+trochanter  $360\ \mu$  long, tibia  $276$ , tarsus  $95$ . Antennæ 9-jointed, joints measuring in  $\mu$ : (1)  $60$ , (2)  $90$ , (3)  $81-84$ , (4)  $45-51$ , (5)  $57-63$ , (6)  $45-48$ , (7)  $33$ , (8)  $35$ , (9)  $66$ .

Larva (after boiling) bright magenta, elongate, long.  $40.5$ , lat.  $180\ \mu$ . Legs, including femur, slender. The six bristles of anal ring thick and yellowish brown, about  $24\ \mu$  long.

Hab. Zapotlan, Jalisco, Mexico, on wild guava, July 6 (Townsend).

Perhaps a distinct species. The *P. gossypii* (typical), collected by Townsend in 1898 (as reported in Biol. Centr.-Amer.), were preyed upon by Syrphid larvæ. The fly has been bred from these, and is kindly identified by Mr. D. W. Coquillett as *Baccha stenogaster*, Williston.

*Solenophora zapotlana*, sp. n.

♀.—On bark of twigs; broadly oval, about  $2\frac{1}{2}$  millim. long, with a slightly produced perforated caudal process, directed a little upwards. Colour a sort of pale ferruginous, but nearly covered with a greyish-white incrustation. Younger specimens are coarsely cancellated and have irregular, long, tongue-like, lateral processes. ♀ (adult) boiled in KHO stains the liquid yellowish brown; the insect contains a dull red pigment. ♀ a broadly pyriform bag; antennæ mere tubercles, consisting of a ring-like basal joint and an oblong terminal joint ( $25-30\ \mu$  long), tipped with bristles  $18\ \mu$  long. Skin with very numerous large figure-of-8 glands, about  $18\ \mu$  across, some smaller. Diameter of mouth-parts about  $108\ \mu$ . Spiracles rather small. Caudal tubercles about  $65\ \mu$  long, caudal bristles about  $130$ . The caudal end of the insect is abruptly narrowed, with subparallel sides, for

about 270  $\mu$ . The base of this portion shows a broken ring of large circular brownish glands, about 12–18  $\mu$  diameter.

♂.—Scales cylindrical, pale brownish, rough, with an oblique terminal cap.

*Hab.* Zapotlan, Mexico, on sage, July 7 (*Townsend*).

By its small size it resembles *S. coloradensis*.

*Tachardia rotundata*, W. P. & T. D. A. Ckll., sp. n.

♀.—Scale hemispherical, about 6 millim. long,  $5\frac{1}{2}$  broad, 4 high; black, with a pink tint here and there, with a slight protuberance on each side, but not exhibiting the raised points of *T. gemmifera*; margin with short tongue-like processes. From the dorsal orifices spring white waxen threads. ♀ (boiled) is pink, broad-oval, about 5 millim. long (*T. fulvo-radiata*, *ingæ*, *rubra*, and *mexicana* are about 3 millim. or less); spine long and slender, abruptly broadened, but not greatly, at the base. Caudal process long and tapering, the apical half strongly chitinized. Dorsal excretory processes very peculiar, dark brown and strongly chitinized, very broad at base, inverted basin-shaped, with the apical portion separated by a constriction, its broad termination truncate and more or less trilobed. Young scales reddish, star-like in form, with six rays.

*Larva* long and narrow. ♂ scales as usual in the genus, but broadened in the region of the round cap, which is not much over a third the diameter of the scale.

*Hab.* El Platanos, Mexico, on "Zicna" and "Guasima," Aug. 4 (*Townsend*).

Something like *T. gemmifera*, but that species has the dorsal excretory processes subcylindrical, not contracted before the apex.

*Tachardia nigra*, Twms. & Ckll.

Tonila, Jalisco, Mexico, Aug. 3 (*Townsend*).

*Conchaspis angræci*, Ckll., var. *hibisci*, Ckll.

Platanos, Jalisco, Mexico, on "Rosa Maria," Aug. 4 (*Townsend*).

East Las Vegas, New Mexico, U.S.A.,  
Nov. 23, 1902.

XIX.—*Notes on the Natural History of East Finmark.* By  
Canon A. M. NORMAN, M.A., D.C.L., LL.D., F.R.S.,  
F.L.S.

[Continued from p. 32.]

PODOSOMATA, Leach.

(=PANTOPODA, Dohrn.)

IN the following list the species without habitat have been found by G. O. Sars in the Varanger Fiord except *Nymphon macrum* and *Chatonymphon macronyx*, which were dredged by the Norwegian North-Atlantic Expedition, Stat. 262, lat. 70° 36' N., long. 32° 35' E., in 148 fathoms, in the sea to the east of Vardö \*.

*Pycnogonum littorale*, Ström.

*Phoxichilidium femoratum*, Rathke. Vadsö, tide-marks.

*Pseudopallene circularis*, Goodsir, = *P. intermedia* and *P. discoidea*, Krøyer.

— *spinipes*, Fabricius.

*Cordylochele brevicollis*, G. O. Sars.

*Nymphon longitarse*, Krøyer. Dredged near Vadsö.

— *gracilipes*, Heller.

— *macrum*, Wilson.

*Chatonymphon hirtipes*, Bell. Varanger and Bög Fiords.

— *macronyx*, G. O. Sars.

*Boreonymphon robustum*, Th. Bell, = *Nymphon abyssorum*, Norman. Varanger Fiord, 125 fathoms. It is the first time that this species, which is abundant in great depths in the Arctic Ocean, has been found in a fiord.

INSECTA.

COLEOPTERA.

Herr Schneider informs me that he knows about 400 species of Coleoptera from Sydvaranger, but that he does not wish to publish a fresh list until he has worked out certain groups. The coleopterist may, however, refer to Herr Schneider's paper, "Sydvarangers entomologiske Fauna, 1<sup>st</sup> Bidrag, Coleoptera," Tromsø Mus. Aarsh. xv. 1893, pp. 17-104. One hundred and ninety species are recorded in that paper.

\* Sars (G. O.), 'Norwegian North-Atlantic Expedition,' *Pycnogonidea* (1891).



HYMENOPTERA.

*Bombidæ of Sydvaranger.* By J. SPARRE SCHNEIDER.

<i>Bombus alpinus</i> , Zetterstedt.	<i>Bombus Kirbyellus</i> , Curtis, = <i>nivalis</i> , Zetterstedt.
— <i>lapponicus</i> , Fabr.	— <i>hypnorum</i> , Linné.
— <i>pratorum</i> , Linné.	— <i>hyperboreus</i> , Schönk.
— <i>terrestris</i> , Linné.	<i>Psithyrus vestalis</i> , Fourcr.
— <i>jonellus</i> , Kirby, = <i>scrimshiranus</i> , auct.	— <i>lessonurus</i> , Thoms.

The third part of the second volume of Römer and Schaudinn's 'Fauna Arctica' has reached me to-day (Dec. 20, 1902). The first paper in this part is by Hans Kiaer, "Die arktischen Tenthrediniden," which contains many East Finmark records; but these will be found more fully given in a paper by the same author, "Uebersicht der phytophagen Hymenopteren des arktischen Norwegens," in 'Tromsø Museums Aarshefter,' vol. xix. 1898.

The second paper is by H. Friese, "Die arktischen Hymenopteren mit Ausschluss der Tenthrediniden." This is illustrated by a plate, which gives excellent coloured figures of *Bombidæ*, including some of the species in Herr Schneider's list here given, together with some notes by my friend on the family. H. Friese gives the number of Hymenoptera (exclusive of Tenthredinidæ) which are found in Arctic Norway and Lapland as three hundred and eighty (including forty-five *Apidæ*, of which fifteen belong to *Bombus*), but there is no separate information with respect to the East Finmark species.

*LEPIDOPTERA of Sydvaranger* \*. By J. SPARRE SCHNEIDER.

RHOPALOCERA.

<i>Papilio machaon</i> , L.	<i>Lycæna argyrognomon</i> , Bergst.
<i>Pieris brassicæ</i> , L.	(= <i>argus</i> , auct.).
— <i>rapæ</i> , L.	— <i>opilete</i> , Kn., var. <i>cyparissus</i> , Hb.
— <i>napis</i> , L., var. <i>bryoniæ</i> , O.	— <i>eumedon</i> , Esp.
<i>Colias palæno</i> , L., and var. <i>lapponica</i> , Stgr.	<i>Vanessa urticæ</i> , L., var. <i>polaris</i> , Stgr.
<i>Thecla rubi</i> , L.	— <i>antiopa</i> , L.
<i>Polyommatus phlœas</i> , L., var. <i>americana</i> , Darb.	— <i>cardui</i> , L.
— <i>amphidamas</i> , Esper.	<i>Melitæa iduna</i> , Dalm.

\* For full notes on the Lepidoptera of Sydvaranger see "Sydvarangers entomologiske Fauna, 2<sup>det</sup> Bidrag, Lepidoptera," J. Sparre Schneider, Tromsø Museums Aarshefter, xviii. 1895. A few species are added by Herr Schneider in this list, in order to complete it up to the present time.

Melitæa parthenie, <i>Bkh.</i>	Argynnis polaris, <i>B.</i>
Argynnis aphirape, <i>Hb.</i> , var. ossianus, <i>Hbst.</i>	— freya, <i>Thbg.</i>
— selenæ, <i>Schiff.</i> , and var. hela, <i>Stgr.</i>	— frigga, <i>Thbg.</i>
— euphrosyne, <i>L.</i> , var. fingal, <i>Hbst.</i>	— aglaia, <i>L.</i>
— pales, <i>S. V.</i> , var. lapponica, <i>Stgr.</i>	Erebia lappona, <i>Esp.</i>
— arsilache, <i>Esp.</i> , var. lapponica, <i>Schöyen.</i>	— embla, <i>Thbg.</i>
	— disa, <i>Thbg.</i>
	Æneis norna, <i>Thbg.</i>
	— bore, <i>Schn.</i>
	Syrichthus centaureæ, <i>Rbr.</i>

## SPHINGES.

Acherontia atropos, <i>L. ?</i>	Zygæna exulans, <i>Hoch.</i> and var.
Sphinx pinastri, <i>L. ?</i>	— vanadis, <i>Dalm.</i>
Deilephila Galii, <i>Roth.</i>	Sesia culiciformis, <i>L.</i>

## BOMBYCES.

Nola karelica, <i>Tgstr.</i> (=arctica, <i>Schöyen.</i> )	Leucoma salicis, <i>L.</i>
Arctia festiva, <i>Bkh.</i>	Bombyx cratægi, <i>L.</i> , var. ariæ, <i>Hb.</i>
— Quenseli, <i>Payk.</i> , var. gelida, <i>Mösch.</i>	Eriogaster lanestris, <i>L. ?</i>
Spilosoma fuliginosa, <i>L.</i> , var. borealis, <i>Stgr.</i>	Saturnia pavonia, <i>L.</i>
Hepialus fusconebulosus, <i>De Geer</i> (=vellida, <i>Hb.</i> )	Notodonta dromedarius, <i>L.</i>
Phymatopus hecta, <i>L.</i>	— dictæoides, <i>Esp.</i> , var. frigida, <i>Zett.</i>
Psyche Standfussii, <i>H.-S.</i>	Cymatophora duplaris, <i>L.</i>
	Asphalia flavicornis, <i>L.</i> , var. finmarchica, <i>Schöyen.</i>

## NOCTUÆ.

Acronycta auricoma, <i>S. V.</i> , var. pyhævaræ, <i>Hoffm.</i>	Plusia parilis, <i>Hb.</i>
Agrotis hyperborea, <i>Zett.</i>	— diasema, <i>B.</i>
— gelida, <i>Sp. Schneider.</i>	— Hochenwarthi, <i>Hoch.</i>
— speciosa, <i>Hb.</i> , var. arctica, <i>Zett.</i>	Anarta Bohemanni, <i>Stgr.</i>
— (Pachnobia) carnea, <i>Thbg.</i>	— cordigera, <i>Thbg.</i>
— conflua, <i>Tr.</i>	— melaleuca, <i>Thbg.</i>
Mamestra glauca, <i>Hb.</i> , var. lapponica, <i>Dup.</i>	— funebris, <i>Hb.</i>
Hadena Maillardi, <i>Hb.</i>	— melanopa, <i>Thbg.</i>
— adusta, <i>Esp.</i>	— quieta, <i>Hb.</i> (=Schoenherri, <i>Zett.</i> ).
Anomogyna lætabilis, <i>Zett.</i>	— Schoenherri, <i>Stgr.</i> (non <i>Zett.</i> ).
Orthosia iris, <i>Zett.</i> , var. crasis, <i>H.-S.</i>	— lapponica, <i>Thbg.</i>
Plusia interrogationis, <i>L.</i>	— Zetterstedtii, <i>Stgr.</i>
	Brephos parthenias, <i>L.</i>

## GEOMETRÆ.

Acidalia fumata, <i>Stph.</i>	Psodos coracina, <i>Esp.</i>
— Schöyeni, <i>Sp. Schneider.</i>	Pygmæna fusca, <i>Thbg.</i>
Selenia bilunaria, <i>Esp.</i>	Fidonia carbonaria, <i>Cl.</i>
Ploseria pulverata, <i>Thbg.</i>	Anaitis paludata, <i>Thbg.</i> , and var. obscurata, <i>Schöyen.</i>
Biston pomonarius, <i>B.</i>	Lobophora carpinata, <i>Bkh.</i>
Gnophos sordaria, <i>Thbg.</i>	

*Lygris prunata*, L.  
 — *populata*, L.  
*Cidaria truncata*, *Hufn.*, var.  
*Schneideri*, *Sandberg*.  
 — *munitata*, *Hb.*  
 — *turbata*, *Hb.*, var. *arctica*,  
*Schöyen*.  
 — *incursata*, *Hb.*  
 — *fluctuata*, L.  
 — *montanata*, *Bkh.*, var. *lap-*  
*ponica*, *Stgr.*  
 — *ferrugata*, *Cl.*, var. (ab.) *spa-*  
*dicearia*, *Bkh.*  
 — *suffumata*, *S. V.*, var. *arctica*,  
*Schöyen*.  
 — *designata*, *Hufn.*  
 — *abrasaria*, *H.-S.*

*Cidaria dilutata*, *Schiff.*  
 — *cineraria*, *Schöyen*.  
 — *cæsiata*, *Lang.*  
 — *sociata*, *Bkh.*  
 — *lugubrata*, *Staudgr.*, var.  
*obductata*, *Moeschl.?*  
 — *subhastata*, *Nolck.*  
 — *affinitata*, *Stph.*, var. *turbaria*,  
*Stph.*  
 — *minorata*, *Tr.*  
 — *alchemillata*, L.  
 — *adæquata*, *Bkh.*  
 — *albulata*, *Schiff.*  
*Eupithecia togata*, *Hb.?*  
 — *hyperboreata*, *Stgr.*  
 — *satyrata*, *Hb.*  
 — *altenaria*, *Stgr.*

PYRALIDINA.

*Scoparia centuriella*, *Schiff.*  
 — *gracilalis*, *Stt.*  
 — *sudetica*, Z.  
 — *murana*, *Curt.*, var. *tuoniana*,  
*Hoffm.*  
*Botys decrepitalis*, *H.-S.*  
 — *inquinatalis*, Z.  
*Crambus ericellus*, *Hb.*

*Crambus truncatellus*, *Zett.*  
 — *maculalis*, *Zett.*  
 — *furcatellus*, *Zett.*  
 — *biarmicus*, *Tystr.*  
*Pempelia fusca*, *Hw.*  
*Myelois annulatella*, *Zett.*  
 — *tetricella*, *S. V.*

TORTRICINA.

*Tortrix ministrana*, L.  
 — *Forsterana*, F.  
 — *viburnana*, *S. V.*  
 — *rubicundana*, *H.-S.*  
 — *lapponana*, *Tystr.*  
*Sciaphila ooseana*, *Scop.*  
*Cochylis deutschiana*, *Zett.*  
*Retina resinella*, L.?  
*Penthina sororculana*, *Zett.*  
 — *dimidiana*, *Sodoff.*  
 — *sauciana*, *Hb.*  
 — *lediana*, L.  
 — *turfosana*, *H.-S.*  
 — *metallicana*, *Hb.*  
 — *nebulosana*, *Zett.*  
 — *palustrara*, Z.  
 — *Schæfferana*, *H.-S.*

*Penthina Schutziiana*, F., and var.  
*jivaarana*, *Hoffm.*  
 — *rivulana*, *Scop.*  
 — *cespitana*, *Hb.*  
 — *lacunana*, *S. V.*  
 — *bifasciana*, *Hw.*  
 — *bipunctana*, F.  
*Grapholitha subocellana*, *Don.*  
 — *tetraquetrana*, *Hw.*  
*Steganoptycha ericetana*, *H.-S.*  
 — *quadrana*, *Hb.*  
 — *Gyllenbaliana*, *Thbg.*  
 — *mercuriana*, *Hb.?*  
*Phoxopteryx uncana*, L.  
 — *unquicella*, L.  
 — *myrtillana*, *Tr.*

TINEINA.

*Talæporia borealis*, *Wk.*  
*Solenobia cembrella*, L.  
*Scardia tessulatella*, Z.  
*Blabophanes rusticella*, *Hb.*  
*Tinea arcuatella*, *Stt.*  
 — *cloacella*, *Hw.*  
 — *picarella*, *Cl.*

*Tinea* sp.?  
*Myrmecozela ochraceella*, *Tystr.*  
*Incurvaria velutella*, *Zett.*  
 — *capitella*, *Cl.*  
 — *rupella*, *Schiff.*  
*Nemophora Panzerella*, *Hb.*  
*Adela Esmarkella*, *Wocke.*

*Adela cuprella*, *Thbg.*  
*Swammerdamia griseocapitella*,  
*Zett.*  
 — *consperscella*, *Tgstr.*  
*Argyresthia Gœdartaella*, *L.*  
*Plutella cruciferarum*, *Z.*  
*Semioscopis avellanella*, *Hb.*  
*Depressaria ciniiflonella*, *Z.*  
*Gelechia infernalis*, *H.-S.*  
 — *continuell*, *Z.*  
 — *virgella*, *Thbg.*  
 — *persperscella*, *Wk.*  
 — *lugubrella*, *F.*

*Gelechia viduella*, *F.*  
 — *diffinis*, *Hw.*  
*Pleurota bicostella*, *L.*  
*Æcophora stipella*, *L.*  
 — *similella*, *Hb.*  
*Ornix*, *sp.*  
*Coleophora laripennella*, *Z.*  
*Butalis chenopodiella*, *Hb.*  
*Endrosis lacteella*, *Schiff.*  
*Elachista atricomella*, *Stt. ?*  
*Lithocolletis rayella*, *L.*  
*Nepticula* *sp.*

## MICROPTERYGINA.

*Micropteryx aureatella*, *Scop.*

| *Micropteryx semipurpurella*, *Stph.*

## PTEROPHORINA.

*Platyptilia Zetterstedtii*, *Z.*

| *Leioptilus tephradactylus*, *Hb.*

*Notes on the List of Lepidoptera.* By A. M. N.

Entomologists who desire to know the synonymy and learn the Arctic distribution of the Sydvaranger Lepidoptera may consult Dr. Arnold Pagenstecher's "Die arktische Lepidoptera" in the 'Fauna Arctica,' vol. ii. 1902, pp. 198-400. It should be borne in mind, however, that the catalogue given here by Schneider is still later than that of Pagenstecher.

It may be interesting to throw into tabular form the Sydvaranger Lepidoptera, and for comparison with them the numbers of Lepidoptera which are known to inhabit a locality in West Norway as well as those of other Arctic parts of Norway.

Column 1 is filled in from Schneider (J. Sparre), "Coleoptera og Lepidoptera ved Bergen og i nærmest omegn," Bergens Museum Aarbog, 1901.

Columns 3 and 5 from Schneider (J. Sparre), "Lepidopterfauna'en på Tromsøen og i nærmeste omegn," Tromsø Museums Aarshefter, xv. 1893, p. 150.

Columns 2 and 4 from Schneider (J. Sparre), "Tillæg til Tromsø og omegns Lepidopterfauna," Tromsø Museums Aarshefter, xxiii. 1901, p. 200.

Column 6 from this paper.

These figures show how very rich Sydvaranger is in larger Lepidoptera, and especially in butterflies. No doubt considerable additions will be hereafter made to the groups of smaller species. Considering the small area of country



included in Sydvaranger and its Arctic situation the list must be considered altogether very full.

	Bergen.	Whole of Arctic Norway.	Saltdalen.	Tromsø.	Alten.	Sydvaranger.
Rhopalocera .....	28	49	30	18	26	31
Sphinges .....	6	10	2	4	2	5
Bombyces .....	24	29	14	4	7	15
Noctuæ .....	59	50	25	14	22	25
Geometræ .....	76	84	57	30	38	33
Pyralidina .....	24	37	23	11	18	14
Tortricina .....	45	80	38	28	39	32
Tineina .....	24	109	51	35	62	38
Mycropterygina .....	1	4	3	2	3	2
Pterophorina .....	4	10	7	2	2	2
Alucitana .....	1	0	0	0	0	0
	292	462	250	148	219	202

#### DIPTERA.

One most unpleasant experience in Sydvaranger is derived from the enormous swarms of mosquitos. These are bred in the marshy ground near the margin of the fiords, and when dredging clouds were perpetually settling upon us. The natives escaped, however, their persecution altogether; my Norwegian friends were not much troubled; but I was a victim, containing delicious sweet blood which no previous mosquitos had tainted, and they made the most of me. Hands, forehead, and neck were one mass of bites, and for a fortnight the irritation was most trying; however, smearing all exposed parts with oil of cloves did not a little to keep them off, and after a time they did not attack me so cruelly as they had done at first. Why was this? It is a wonderful thought, but yet it is, I believe, the fact that the bites of these little wretches had at the same time that they sucked my blood infused something into the blood they were sucking which had affected the whole of that in my body in such a way that their wonderful power of scent told other mosquitos that it was no longer so delicious as it had been, in that it had now been subjected to the attacks of their brethren. Although the bites of these mosquitos are not malaria-

infecting, the extreme irritation naturally made their martyr very feverish. Luckily they attack by day in bright sunshine, and did not come into the house at night.

I think that there must be two species of these mosquitos, because while all vestige of hundreds of bites has passed away, about a dozen spots still remain, and through life will remain, on the backs of my hands, to remind me of the Sydvaranger pests, and to point to some of them as apparently belonging to a more venomous kind than the majority \*.

The following is what M. de Guerne writes concerning these mosquitos (*l. c.*† p. 21), as experienced by him in Klosterelv Fiord:—"Malheureusement, au mois de juillet, les moustiques gâtèrent tout le charme de ce séjour. Ils s'abattaient en foule sur la navire, pénétrant jusque dans la cale, sans qu'il fût possible de leur faire une guerre efficace. Un des officiers du bord étant descendu à terre sans avoir revêtu l'indispensable voile de gaze, reparut méconnaissable au bout de quelques heures; ces maudites bestioles l'avaient tellement piqué autour des yeux que ses paupières gonflées l'empêchaient de voir. Je comprends aujourd'hui la kyrielle d'épithètes injurieuses lancées contre ses insupportables diptères par tous ceux qui ont visité le Finmark. Avant le départ j'étais disposé à trouver leurs récits exagérés sur le point; il n'en est rien. A l'heure présente, ayant souffert comme mes prédécesseurs, je suis d'avis que la vocabulaire français n'offre pas le qualificatif assez énergique pour désigner ce lamentable fléau, cette peste vivante causée par une insecte si bien appelé par Pallas *infestissimus*."

Again, writing of the banks of the Pasvik River he says (p. 33):—"Il est impossible de se faire une idée de l'abondance extraordinaire de ces odieux insectes; tout les récits à ce sujet paraissent absolument exagérés, il n'en est rien. On a plein les yeux de moustiques, plein la bouche en mangeant, plein le nez; le moustiquaire est indispensable et l'on ne peut quitter les gants. Je me suis plusieurs fois enfoncé les mains dans les chaussettes pour supprimer toute interruption entre les gants et la manche de l'habit; les poignets sont noirs de ces sales bêtes. Plusieurs fois, le sommeil m'a été impossible à cause de ces maudits animaux; on a beau s'enfumer, se couvrir d'huile aromatique, il en vient tant et

\* Herr Schneider informs me that common species of the district are *Culex nemorosus*, Mug., *C. pipiens*, Linn., *C. cantans*, Mug., and *C. annulatus*, Fabr.

† 'Union Géographique du Nord de la France. Conférences faites par M. Jules de Guerne. Souvenirs d'une Mission Scientifique en Laponie, 1880.'

tant qu'on est malgré tout forcé de souffrir. Jugez d'après cela de ce que sont les nuits passées en plein air sur les bords du Pasvik, j'étais bien heureux de rencontrer en passant de pauvres cabanes éclairées par la cheminée seule; j'entrais à genoux dans ces réduits enfumés où j'avais au moins la satisfaction de reposer tranquillement à l'abri des insupportables diptères. Une exploration scientifique est assez méritoire dans les pareilles conditions."

[To be continued.]

XX.—*On some new Genera and Species of Parasitic and Fossorial Hymenoptera from the Khasia Hills, Assam.*  
By P. CAMERON.

Ichneumonidæ.

JOPPINI.

IMERIA, gen. nov.

Head large, cubital, largely developed behind the eyes; the occiput roundly convex, its sides not distinctly margined. Eyes parallel; the malar space large. Clypeus not separated from the face, indistinctly foveate at the base. Mandibles large; their apex with two large, equal, widely separated, long, sharply pointed teeth. Scutellum longer than broad; its sides with large, narrow, leaf-like keels. Median segment areolated at the base; the sides of the apex sharply keeled, the middle of the keel with a blunt tooth; the spiracles elongate, curved, broadest at the base. Prosternum large, leaf-like below, with a distinct margin. Legs: the fore tarsi twisted at the base. Abdomen not much longer than the head and thorax united, with eight segments; the ventral fold on the second and third segments; the ovipositor largely projects. Areolet oblique, almost triangular. Antennæ dilated and compressed towards the apex.

Belongs to the Joppini and resembles somewhat the Neotropical genus *Edicephalus*. It comes near *Xenojoppa*, Cam., *olim Margrettia*, Cam., from which it may be known by the hinder coxæ not being toothed, by the keels on the scutellum not being raised and leaf-like, by the face and clypeus forming one piece, by the petiole not being perceptibly thickened towards the apex, by its spiracles being

much smaller, rounder, and not nearly so elongated, and by the dorsal segments not being longitudinally striated. Characteristic is the fact that the longitudinal keels on the metanotum are obsolete, and, on the other hand, there are transverse ones, as in the *Cryptina*. The mandibles are peculiar; they are broad at the base, project largely downwards below the head, and appear as if they were attached by the upper part only and not by the whole width of the base.

The differences between *Imeria*, *Xenojoppa*, and *Habrojoppa* may be shown thus:—

- |  |             |
|--|-------------|
| A. Abdomen with seven dorsal segments, the mesonotum coarsely reticulated, mandibles and fore coxæ normal.   |             |
| Postpetiole widely dilated at the apex as in the <i>Platyuri</i> , clearly separated, the hinder coxæ toothed .....  | XENOJOPPA.  |
| Postpetiole not widely dilated, not clearly separated from the petiole, the hinder coxæ not toothed .  | HABROJOPPA. |
| B. Abdomen with eight dorsal segments. Mandibles very broad, thick, and developed straight downwards at the base; the fore coxæ large, globular, largely developed behind the base of the trochanters; the mesonotum not reticulated ..... | IMERIA.     |

*Imeria albomaculata*, sp. n.

Black, shining; a line, broad and oblique on the top, gradually narrowed towards the apex, on the inner, a somewhat oblong one on the outer orbits, not reaching to the bottom of the eyes, a mark, broadly, triangularly dilated on the outer side beneath, on the outer lower orbits, the clypeus except a small black mark in the middle above, the mandibles except the teeth, the palpi, the base of the pronotum, the yellow continued more narrowly to the end of the pleuræ, a short line on the sides in front of the tegulæ, tubercles, an irregular somewhat triangular mark on the lower side of the mesopleuræ, at the apex, the scutellum, post-scutellum, a large triangular mark on the side of the median segment before the spiracles, the apex of the median segment, following the outlines of the areæ, thus being somewhat triangular above, and laterally on the lower side continued into the spiracular area immediately over the coxæ, yellow. Wings hyaline, the stigma testaceous, the nervures darker. The four anterior legs rufo-fulvous, with their coxæ and trochanters white; the hinder coxæ black, their apical three fourths white above; the hinder trochanters and femora rufo-fulvous; the basal joint of the



trochanters yellow above, blackish on the inner side; the hinder knees, the apex of the tibiae, and the trochanters black. The base of the petiole, of the second and third abdominal segments broadly, the apical two segments entirely, and the apices of the middle segments very narrowly, yellowish white. ♀.

Length 10 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Antennæ as long as the body; the ninth to the fifteenth or sixteenth joints white; the scape strongly punctured and thickly covered with fuscous hair. Face closely, but not strongly, punctured. Mesonotum closely, uniformly, but not strongly rugosely punctured, and, especially at the sides, is thickly covered with short fuscous hair. Scutellum obscurely punctured and sparsely covered with long fuscous hair. Median segment closely and strongly rugose, more or less reticulated; its extreme base in the middle depressed, smooth; the supra-external area large, wider than long; on the outer side closely longitudinally striated, on the inner closely and coarsely aciculated, almost punctured; the spiracular area is aciculated.

*Cyanojoppa* \* *cærulea*, sp. n.

Blue, the head, thorax, and legs thickly covered with white pubescence; the inner orbits, a small mark on the sides of the clypeus, a longish line on the outer orbits, a line on the apical two thirds of the pronotum, the outer side of the tegulæ, the tubercles, and a mark on the lower side of the mesopleuræ at the base, yellowish white; the wings fuscous violaceous, the nervures and stigma black; the apex of the four front femora and the four anterior tibiae in front yellowish white. ♀.

Length 15 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Head and thorax thickly covered with white pubescence, closely and distinctly punctured; the scutellum more sparsely punctured than the mesonotum, the postscutellum closely longitudinally striated. The lower half of the propleuræ is much more strongly punctured than the upper; the punctation almost forms reticulations. Metathorax closely and strongly punctured; the base is more sparsely punctured than the rest; the areola is widely separated from the base; it is slightly longer than broad, open at the base, and slightly narrower there than it is at the apex; its sides are

\* *Cyanojoppa*, Cam. Zeits. f. Hymen. u. Dipt. 1902, p. 398.

roundly curved outwardly, its apex is roundly, but not much curved inwardly. The postpetiole is closely longitudinally striated; there may be two small white marks on its apex. The second and following segments are closely and somewhat strongly punctured; the base of the second is longitudinally striated; the gastrocœli are obscurely striated at the base.

*Cyanojoppa albonotata*, sp. n.

Blue, the head and thorax covered with white pubescence the inner orbits, the outer more narrowly in the middle, the sides of the clypeus, an irregular mark outside the middle, the maxillary palpi except at the base, a line on the pronotum, the tubercles, the apex and the apical half of the sides, and two small marks on the apex of the basal three segments of the abdomen, yellowish white; the wings fuscous violaceous, the nervures and stigma black. ♂.

Length 15 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Head and thorax closely and somewhat strongly punctured; the apex of the propleuræ more or less striated; the apex of the postscutellum impunctate in the middle. The areola has the basal half somewhat more distinctly narrowed than the apical; its sides are foveate, the central part irregularly shagreened; the posterior median area distinctly projects triangularly into it and is closely rugosely punctured; the spiracular area, except at the base, is coarsely irregularly reticulated. Postpetiole finely and closely striated at the base, the apex almost smooth. The second and following segments have a distinct purple tint; the second, third, and fourth are closely and rather strongly punctured, the second in the middle at the base is strongly longitudinally striated; the gastrocœli have a few stout keels at the base. Legs coloured like the body; the four front coxæ, femora, and tibiæ are more or less yellowish beneath.

*Cyanojoppa striata*, sp. n.

Black; the abdomen blue, marked with purple; the head and thorax thickly covered with white pubescence; the inner eye-orbits, the base of the clypeus at the sides, a mark on the base of the mandibles, a narrow line on the edge of the pronotum, the scutellar keels, the tubercles, and a small mark on the base of the mesopleuræ, white; the basal half of the hinder femora red; the wings almost hyaline, the nervures and stigma black. ♂.

Length 15 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Face strongly and closely, the clypeus still more strongly, punctured; the front and vertex strongly punctured, except between the eyes and the hinder ocelli; the front in the middle obscurely transversely striated. Mesonotum closely punctured, the parapsidal furrows indicated at the base; the scutellum as closely but not so strongly punctured; the postscutellum closely punctured at the base. Metanotum closely and distinctly punctured; the posterior median area more or less transversely striated; the lateral area obliquely striated, the basal one finely and closely, the apical more strongly and with the striæ distinct and clearly separated; the spiracular area is closely and weakly striated behind the spiracles, its middle closely and strongly obliquely, its apex more strongly and irregularly. Pleuræ closely and strongly punctured, the propleuræ more strongly than the rest and striated in the middle at the apex. The four front tibiæ and femora may be more or less obscure yellow in front. The base of the petiole is smooth above and has its sides keeled; the middle is stoutly and irregularly and the apex more closely and finely striated. The second segment has the basal half stoutly and closely longitudinally striated; the gastrocœli are stoutly striated in the centre. The tarsal spines are blackish. The areola is small, broader than long, separated from the basal slope by a narrow keel; it is shining and is irregularly striated, the striæ being more or less broken and irregular; it becomes gradually and slightly wider from the base to the apex; the basal slope is closely and finely transversely striated.

This species comes nearest to *C. rufofemorata*, Cam.; but that species may be known from it by the hinder femora being entirely red, by the areola being not separated behind by a keel, and by its being closely reticulated or irregularly punctured throughout, and by the lateral area being closely punctured and reticulated, not distinctly striated throughout as in the present species. *C. nigrocærulea* and *C. cæruleo-caudis* may be known from it by the much larger areola. The median segment is more strongly striated than it is in the other species. In some examples there are two white marks on the apex of the scutellum. The wings may be hyaline or distinctly fuscous throughout.

*Aglaojoppa* \* *flavolineata*, sp. n.

Black, smooth, and shining; the face, orbits, clypeus, labrum, base of mandibles, palpi, two long lines on the

\* *Aglaojoppa*, Cam. Ann. & Mag. Nat. Hist. ser. 7, vol. vii. p. 381.

mesonotum, the scutellum, a mark on the base of the scutellar keels, the postscutellum, a small mark behind the spiracles, the outer apical area extending at the apex on to the spiracular, a broad band on the pronotum, a smaller line on the lower side of the propleuræ, the lower half of the mesopleuræ except at the base and apex, the mesosternum, the tubercles, and a mark under the hinder wings, lemon-yellow. The four anterior legs lemon-yellow, except the femora above and an interrupted line on the tibiæ; the hinder coxæ, femora, and apical third of the tibiæ black. The apex of the petiole, a large mark on the sides of the second, third, fourth, and fifth segments at the apex, lemon-yellow; the marks on the second larger, on the fifth much smaller than on the others. Wings violaceous fuscous, paler at the base; the stigma and nervures black. ♂.

Length 15 mm.

*Hab.* Khasia Hills. Coll. Rothney.

The scape and the basal third of the flagellum yellowish fulvous beneath. Face and clypeus sparsely punctured, the sides and apex of the clypeus smooth. Mesonotum covered with large, rather widely separated punctures and with rather long fuscous hair; the scutellum with longer and somewhat paler hair. Areola twice broader than long; its basal keel semicircular and not so clearly defined as the others; the posterior median area coarsely punctured, except at the extreme base; all the punctures are deep and distinctly defined. Pro- and mesopleuræ with shallow punctures; the apex of the propleuræ coarsely, deeply, and irregularly punctured, of the mesopleuræ crenulated, the lower part with a small upper and a much larger lower fovea. Petiole smooth, neither punctured nor striated. Gastrocœli large, deep, their base with five diverging striæ; the space between them closely striated; the second to fifth segments are closely punctured.

*Aglaojoppa femorata*, sp. n.

Comes near to *A. flavomaculata*, but the yellow markings are much less extensive (there are only four on the abdomen), the mark on the mesopleuræ is much smaller, the two marks on the mesonotum are shorter, and the areola is more clearly defined.

Black, shining; the scape of antennæ below, the face, clypeus, labrum, base of mandibles, the palpi, the inner orbits, the lower two-thirds of the outer more broadly, the edge of the pronotum broadly except at the apex, two short



marks on the middle of the mesonotum, scutellum, post-scutellum, the greater part of the lateral area of the metanotum, the lower part of the propleuræ, the tubercles, a large mark, slightly longer than broad, on the mesopleuræ on the lower side near the base, a small mark on the metapleuræ under the wings, and a larger irregularly oval mark on their centre, lemon-yellow. Wings uniformly fuscous violaceous; the stigma and nervures black. Legs lemon-yellow; the four anterior femora broadly, the fore tibiæ behind throughout, the middle and hinder pair at the base behind, the basal half of the hinder femora, and the basal joint of the hinder tarsi black at the base. Abdomen black; a mark obliquely narrowed behind on the apex of the petiole, and two larger marks on the apex of the second segment, lemon-yellow. ♂.

Length 15 mm.

*Hab.* Khasia Hills. Coll. Rothney.

The base of the median segment is smooth, its middle obliquely depressed; the areola is slightly longer than broad, and is gradually and slightly widened towards the apex; the posterior median area is closely, rugosely, transversely striated; the outer apical area stoutly obliquely striated; the spiracular finely rugose at the base, its apex stoutly striated. The second and third abdominal segments are closely punctured and striated in the middle; the gastrocœli deep, obscurely striated at the base. Face and clypeus covered, but not closely, with large punctures and sparsely with short white hair; the clypeal foveæ large. Apex of propleuræ depressed, irregularly striated.

*Aglaojoppa cæruleodorsata*, sp. n.

Black; the face, inner orbits, clypeus, labrum, base of mandibles broadly, the inner orbits narrowly above, broadly below, the edge of the pronotum broadly, two short marks in the centre of the mesonotum, a mark on the sides of the scutellum, broad behind, narrowed to a point at the apex, postscutellum, a mark on the lower side of the propleuræ behind, a large mark reaching to near the apex and prolonged narrowly upwards at the base, the mesosternum in the middle, the tubercles, a small and a large mark immediately under the hind wings, a curved one immediately behind the spiracles, a large mark in front of them over the coxæ, the sides of the petiole broadly, its apex narrowly, and a mark on the abdominal segments 2 to 5 on the sides, these marks becoming successively smaller, yellow. The

second and following segments of the abdomen blue; the second segment in the middle strongly longitudinally striated. Wings fuscous, the stigma black. ♂.

Length 16 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Antennæ stout, the scape white beneath. Face and clypeus punctured, sparsely covered with short hair; the labrum projecting, rounded at the apex, and fringed with long pale hair. Mesonotum strongly punctured, the punctures becoming smaller towards the apex; the scutellum more strongly punctured than it in the middle. Postscutellum impunctate. Base of median segment smooth, with only a few scattered punctures; the areola is wider than long, and is separated by its own length from the base of the segment; the posterior intermediate area is strongly transversely striated; the posterior median area is wide and is closely transversely striated; the other areæ are closely rugosely punctured. Propleuræ obscurely striated behind, the mesopleuræ punctured, but not strongly; the metapleuræ more closely punctured and with a distinct keel on the lower side. Fore legs with the femora and tibiæ lined with black above, the middle femora lined with black to near the apex and all round at the base; the hinder femora black, except at apex; the metatarsus black, except at the apex; the base of the second joint narrowly black; the hind tibiæ black, broadly white at the base. The middle of the petiole is longitudinally striated. Areolet narrowed at the top, the nervures meeting there.

This species is not quite a typical *Aglaojoppa*; the areolet is more narrowed at the top; the colour is paler, it being almost white, and the blue abdomen also separates it from the other species.

*Acanthojoppa*\* *indica*, sp. n.

Luteous, marked with yellow; a black mark on the base of the mesonotum, a line along the base from the middle of the pronotum to the end of the tegulæ and the depression at the base of the scutellum yellow; the wings beyond the stigma fuscous, with a slight violaceous tint; the stigma dark testaceous. ♂.

Length 13 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Basal half of the antennæ rufo-fulvous, the scape with a yellowish tinge on the lower side. The face and clypeus

\* *Acanthojoppa*, Cam., 'The Entomologist,' 1899, p. 109.

yellow ; the face closely punctured, the clypeus covered with a pale pubescence ; the vertex closely punctured and thickly covered with short blackish pubescence. Mandibles pale yellow, the teeth black. Mesonotum dark rufous, a mark on the base, a line along the base from the middle of the pronotum to the end of the tegulæ, and the depression at the base of the scutellum, black. Scutellum paler, of a more yellowish tint than the mesonotum ; it is more distinctly and less closely punctured, and is covered all over with longish black hair ; its apex, on the top, has a shallow depression ; its sides are not keeled. Metanotum strongly and closely punctured ; its sides, base, and apex bordered with black ; the apical half of the posterior median area black : the areola is about as broad as long, its base is rounded, its apex transverse ; inside it is a stout central keel, not reaching to the base, and there is an oblique one on either side, the base is hollowed. The upper half of the propleuræ is closely punctured and striated obliquely on the lower side. Mesopleuræ closely and distinctly punctured ; the metapleuræ more strongly punctured, behind the keel stoutly striated ; the hair is long, close, and fuscous in colour. Legs coloured like the body ; the four anterior paler, more yellowish at the base. The wing-areolet is triangular, the nervures touching at the top ; the second transverse cubital nervure is widely bullated. The petiole is smoother and more shining than the rest of the body ; the gastrocœli narrow, smooth, and deep at the base.

*Acanthojoppa lutea*, sp. n.

Luteous, the apical half of the antennæ black, the basal pale yellow ; the wings fuscous hyaline, the apex violaceous, the stigma luteous, the nervures black. ♀.

Length 17–18 mm.

*Hab.* Khasia Hills. Coll. Rothney.

The basal seventeen joints of the antennæ are yellowish, darker coloured at the base. The inner eye-orbits and the sides of the clypeus broadly pale yellow. Face punctured, more strongly and closely in the middle than on the sides ; the base of the clypeus sparsely punctured. Mandibles pale yellow, their teeth black. Mesonotum darker coloured than the rest of the thorax, coarsely and closely shagreened and covered with a short, close, dark pile. Scutellum more distinctly and strongly punctured than the mesonotum ; its apex transverse in the middle, its sides projecting into blunt teeth. The base of the median segment irregularly rugose,

the lateral areæ smooth at the base, the apex is stoutly transversely striated; the posterior median black, with the striæ closer and narrower; the areola is large, longer than broad, its apical half obliquely narrowed; the teeth are large and rounded at the apex. On the thorax the following parts are black: the base and sides of the median segment, the posterior median area, an oblique line below the middle of the propleuræ, the sides of the mesosternum at the base, and the pleuræ before the mesocoxæ. The wings have a distinct yellow tinge to the base of the stigma, the apex with a distinct fuscous-violaceous tint; the stigma luteous. Abdomen shining, the second and third segments closely punctured; the gastrocœli shallow, their outer side with a few obscure striæ.

The violaceous tint is much more distinct on the apex of the fore wings than in the other species, while the areola differs in being sharply narrowed on the apical half.

*Xanthojoppa\* nigrolineata*, sp. n.

Length 20 mm. ♂.

*Hab.* Khasia Hills. Coll. Rothney.

Yellow; the front and vertex broadly in the middle, the former more broadly than the latter and the occiput still more broadly, the sides and apex of the mesonotum broadly, the latter more narrowly than the sides, a broad band in its centre at the base and extending to shortly beyond the centre, the band dilated and rounded at the apex, the space at the base of the scutellum, including the foveæ, the depression at its sides, the base of the median segment, its apex with the teeth, the black band projecting in the middle, the middle of the propleuræ, the mesopleuræ round the top and at the apex, the base of the second abdominal segment, its apex narrowly and it has a faint central line, which is narrowed and faint at the base, the base of the petiole and the third and following segments broadly down the centre, black. Wings fuscous violaceous, the nervures and stigma black. Legs coloured like the body; the hinder tarsi, except at the extreme base and apex, black. The basal eight or nine joints of the antennæ are rufous, the others black or brownish; the scape yellow, almost smooth and sparsely covered with black hair. Face and clypeus smooth, shining, impunctate, and sparsely covered with white hair; the labrum fringed with golden hair. Mesonotum shining, closely, but not strongly, punctured and thickly covered with short fuscous

\* *Xanthojoppa*, Cam. Ann. & Mag. Nat. Hist. ser. 7, vol. vii. p. 378.



hair. Scutellum punctured and thickly covered with fuscous hair. Postscutellum very smooth and shining, glabrous, deeply and widely foveate laterally. The central depression on the median segment is bordered behind by a short stout keel. The rest of the segment is coarsely rugosely punctured; the areola is open behind and is longer than broad; the posterior median and lateral apical areæ coarsely reticulated, longitudinally in the middle, more coarsely transversely at the sides; the teeth stout, black. Propleuræ above punctured. Mesopleuræ shining, the black upper part shagreened, more coarsely at the apex below, the upper part raised, the lower, next to the sternum, also projecting, but not so strongly. Metapleuræ strongly obliquely striated, less strongly at the base. Petiole smooth and shining, the apex triangularly dilated, the base of the second segment strongly longitudinally striated; the gastrocœli elongate, smooth on the outer side, the apex testaceous and separated from the rest by a stout transverse keel; the base of the petiole is stoutly keeled down the middle and less stoutly at the sides.

*Xanthojoppa crassispina*, sp. n.

Length 11-12 mm. ♀.

*Hab.* Khasia Hills. Coll. Rothney.

Very similar in form and coloration to *X. trilineata*, Cam. (Ann. & Mag. Nat. Hist. ser. 7, vol. vii. p. 378), but may be known from it by the form of the scutellum, which has the sides largely bordered by leaf-like expansions from the base to the apex, by the depression at the base being bordered laterally by a stout keel, by there being three areæ on the base of the median segment, and by the gastrocœli being stoutly longitudinally striolated.

Yellow, suffused with fulvous; the ocellar region, the vertex in the middle, the front broadly, a broad line on the middle of the mesonotum extending from the base to shortly beyond the middle, the sides near the tegulæ, the scutellar depression, the depression at the base of the median segment, the middle of the areola, the posterior median area entirely, the middle of the propleuræ, the base of the mesopleuræ and the upper part below the tubercles, a mark over the middle coxæ, and the base and lower side of the metapleuræ, black. Vertex finely punctured, the front very smooth and shining. The face and base of the clypeus with large shallow punctures. Apex of mandibles black, the base covered with soft white hair; before the apex on the lower side with golden hair. Mesonotum closely punctured, dull yellow, suffused at the

sides and middle with rufous. Scutellum roundly convex, large, its sides bordered by stout projecting keels, strongly punctured and covered with long black hair. The depressed base of the median segment is smooth and shining and is bordered at the top in the centre by a curved keel; the depression is wide, deep, and smooth. Postscutellum smooth, shining, and finely striated in the middle at the base; the depression bordered laterally by stout keels. Areola longer than broad, rounded at the base, transverse at the apex; its centre bears some stout irregular striæ. The posterior median area closely, transversely, rugosely punctured, the base with three or four short, stout, longitudinal keels; the sides stoutly transversely striated; the lateral teeth very large, broad, curved, and rounded at the apex. Legs fulvous; the coxæ and trochanters more or less yellow; the tarsi stoutly spined. Wings hyaline, with a distinct fulvous tinge; the stigma fulvous, the nervures darker. Petiole smooth and shining, except on the depressed sides of the apex, which are punctured, the second segment strongly, the others weakly punctured; the gastrocœli shallow, narrow, longish, strongly longitudinally striated. The apex of the petiole, the base and apex of the second and third segments narrowly, and the base of the apical segments more broadly, black; the sheaths of the ovipositor fulvous, black. The four anterior coxæ are, for the greater part, pale yellow; the posterior have the basal two thirds yellow above. Calcaria black. Gastrocœli stoutly irregularly striated.

*Erythrojoppa* \* *lineata*, sp. n.

Ferrugineous; the ocellar region, two broad lines on the centre of the front, the antennæ from the fourteenth joint, a broad band shortly below the middle of the prothorax, the base and sides of the mesonotum and two lines in the centre on the apical half, the space at the sides of the scutellum, the base of the median segment narrowly, the posterior median area, the base, top, and apex of the mesopleuræ, and the base and lower side of the metapleuræ and the apex of the metanotum narrowly, black. Legs coloured like the body, the hinder tarsi black. Wings fuscous violaceous, highly iridescent, the nervures and stigma black. ♂.

Length 20 mm.

*Hab.* Khasia Hills. Coll. Rothney.

The face and pleuræ have a faint, but distinct, yellowish tinge. The face and base of clypeus are sparsely punctured;

\* *Erythrojoppa*, Cam. Ann. & Mag. Nat. Hist. ser. 7, vol. ix. p. 146.

the front has a few transverse striæ. Mesonotum closely and rather strongly punctured and thickly covered with short fuscous pubescence. The pyramidal scutellum is more sparsely punctured and is covered with long pale fuscous hair; on its sides are two or three longitudinal keels or striæ. The basal half of the postscutellum is closely longitudinally striated. Median segment closely and strongly punctured, except the areola, which is smooth and shining; the posterior median area is coarsely transversely striated, more regularly at the base than elsewhere; in the centre is a stout longitudinal keel. Mesopleuræ closely punctured, except on the apex above, where it is smooth. The spiracular area, behind the spiracles, coarsely obliquely striated; the metapleuræ strongly and closely punctured, the punctures running into striations. Abdomen uniformly coloured; the postpetiole obliquely stoutly striated in the middle; the segments are closely and uniformly punctured; the basal half of the second is stoutly, longitudinally, closely striated; the gastro-cæli smooth, with curved stout striæ on the basal half.

May be known from *E. ferruginea* by the abdomen being entirely ferruginous.

*Lagenesta ferruginea*, Cam.\*

The male of this species agrees with the female in coloration. It has a long and narrow abdomen, as in *Erythrojoppa ferruginea*, with which species it agrees closely in form and coloration. It may be known easily from the latter by the flat, not pyramidal, scutellum. The antennæ are serrate.

[To be continued.]

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XXI.—*Some Observations on British Freshwater Harpactids.*

By THOMAS SCOTT, F.L.S.

SINCE the publication of the Monograph of the free and semiparasitic Copepoda of the British Islands by Professor G. S. Brady—a work which gave a fresh impetus to the study of these interesting organisms and which is indispensable to those who desire to become familiar with the group—greater attention has been devoted to the examination of the freshwater forms, and a number of rare and, in some cases,

\* Ann. & Mag. Nat. Hist. ser. 7, vol. vii. p. 377.

new species have been added to the fauna of our inland waters\*. Several of these additional forms belong to the Harpacticidæ, which is one of the largest of the families of the Copepoda.

The Harpactids which form the subject of the following observations are all included in the subfamily Canthocamptinæ, G. S. Brady, and are distributed amongst the succeeding five genera, viz.:—*Canthocamptus*, Westwood; *Nitocra*, Boeck; *Attheyella*, G. S. Brady; *Moraria*, T. & A. Scott; and *Maraenobiotus*, Al. Mrazek.

A few remarks are made on the distinctive characters of each genus, but the species are not described; descriptions and figures of these will be found in the works which are referred to in connexion with each of the species recorded.

#### Subfamily CANTHOCAMPTINÆ, G. S. Brady.

#### Genus CANTHOCAMPTUS, Westwood, 1836.

The nine species grouped together under *Canthocamptus* have eight- or nine-jointed antennules. The inner branches of the first pair of thoracic feet are *non-prehensile*, and they are usually *three-jointed and longer than the outer branches*. The inner branches of the next three pairs are shorter than the outer ones and composed of two or three joints, the *first joint being considerably smaller* than the one next to it.

#### *Canthocamptus staphylinus* (Jurine) †.

1820. *Monoculus staphylinus*, Jurine, Hist. des Monocles, p. 74, pl. vii. figs. 1–19.

1880. *Canthocamptus minutus*, Brady, Brit. Copep. vol. ii. p. 48, pl. xliv. figs. 1–17.

This is one of the more common and generally distributed species belonging to the freshwater Harpacticidæ of the British Islands; it is also the largest, and measures rather more than a millimetre in length.

\* Prof. W. Lilljeborg has recently published an important work on the freshwater Harpacticidæ of Sweden, 'Kongl. Svenska Vetenskaps-Akademiens Handlingar,' Bd. xxxvi. no. 1. This work should be of interest to British students, for of the seventeen species described by the author twelve at least are also found in the inland waters of the British Islands.

† See Additional Note at end of this paper.



*Canthocamptus horridus*, S. Fischer.

1860. *Canthocamptus horridus*, S. Fischer, "Beitr. z. Kennt. d. Entomostr.," Abhandl. d. math.-phys. Classe der königl. bayer. Akad. d. Wissensch. 8ten Bandes, 3te Abth. p. 670, t. ii. figs. 57-59, 59a.  
 1880. *Canthocamptus northumbrius*, G. S. Brady, *op. cit.* vol. ii. p. 57, pl. xlv. figs. 1-14.

This species, which has been identified as the *Canthocamptus horridus* of S. Fischer, appears to be rare in British inland waters. The only Scottish record I have for it is Duddingston Loch, near Edinburgh; Dr. and Miss Sprague also record it from Edinburgh, but they do not give any locality\*. Dr. Brady obtained it sparingly in the lake at Bolam, Northumberland, and Mr. D. J. Scourfield has taken it near London.

*Canthocamptus gracilis*, G. O. Sars.

1863. *Canthocamptus gracilis*, G. O. Sars, "Overs. af den indenl. Ferskv.-Copep.," Vidensk. i Christiania Förhandl. for 1862 (Aft.), p. 22.  
 1897. *Canthocamptus inornatus*, T. Scott, Fifteenth Rep. Fishery Board for Scotland, pt. iii. p. 323, pl. ix. figs. 1-12.  
 1902. *Canthocamptus gracilis*, Lilljeborg, Synopsis Spec. hucusque in aquis dulcibus Sueciæ observ. Fam. Harpactic. p. 26, t. ii. figs. 8-13 (see footnote, p. 1).

There appears to be no doubt that the species which I described in 1897 under the name of *Canthocamptus inornatus* is identical with the *C. gracilis* of G. O. Sars. I have found it in several small lochs in Scotland, such as Rescobie Loch, near Forfar, Linlithgow Loch, one or two small lochs near Edinburgh, Loch Achroy (Trossachs), and others. It has been taken in the Isle of Wight by Mr. D. J. Scourfield, and my son, Mr. A. Scott, has sent it to me from Lancashire.

*Canthocamptus trispinosus*, G. S. Brady.

1880. *Canthocamptus trispinosus*, G. S. Brady, *op. cit.* vol. ii. p. 55, pl. xlv. figs. 15-22.

This appears to be a rare species in the inland waters of the British Islands, but it has apparently an extensive continental distribution; it has been recorded by Herr H. Rehberg, Dr. S. A. Poppe, Dr. O. Schmeil, and Prof. W. Lilljeborg. I know of no Scottish locality for *C. trispinosus*, and the only station for it mentioned by Dr. Brady is the River Nene near Peterborough; but Mr. D. J. Scourfield records

\* Trans. Edin. Field Nat. & Micros. Soc. vol. iv. (1900-1901).

it from one or two ponds near London\*, and the Rev. A. M. Norman has quite recently sent me specimens from Wroxham, Norfolk.

*Canthocamptus minutus*, Claus.

1863. *Canthocamptus minutus*, Claus, Die frei lebenden Copepoden, p. 122, t. xii. figs. 1-3.

1895. *Canthocamptus minutus*, T. & A. Scott, Ann. Scot. Nat. Hist. (Oct. 1895), p. 236, pl. iv. figs. 14-20.

This is one of the smaller of the freshwater Harpactids, and its distribution appears to be coextensive with the British Islands; but it is only within recent years that it has been recognized as a member of the British Copepod fauna.

*Canthocamptus hirticornis*, T. Scott.

1895. *Canthocamptus hirticornis*, T. Scott, Thirteenth Rep. Fishery Board for Scotland, pt. iii. p. 251, pl. ix. figs. 13-26.

1902. *Canthocamptus megalops*, Lilljeborg, "Synop. Spec. hucusque in aquis dulcibus Sueciæ observ. Fam. Harpact.," K. Sv. Vet.-Akad. Handlingar, Band xxxvi. no. 1, p. 30, pl. ii. figs. 14-19.

This is a widely distributed species, at least in Scotland; it has been found in small lochs in the Outer Hebrides and in Shetland, as well as in several places on the mainland; but it occurs usually near the sea. It has been obtained in water that appeared to be quite fresh, as well as in slightly brackish water. I have no record of it from any inland locality. Mr. D. J. Scourfield has taken *C. hirticornis* in a marsh near Barmouth Junction, North Wales†.

The form recorded recently by Herr Prof. Lilljeborg in his interesting work on the freshwater Harpacticidæ of Sweden under the name of *Canthocamptus megalops* appears to be identical with *C. hirticornis*.

*Canthocamptus palustris*, G. S. Brady.

1880. *Canthocamptus palustris*, G. S. Brady, Mon. Brit. Copep. vol. ii. p. 53, pl. xxxix. figs. 13-23.

1895. *Canthocamptus palustris*, var. *elongatus*, T. & A. Scott, Ann. & Mag. Nat. Hist. (6) vol. xv. p. 459, pl. xvi. figs. 7-17.

Though *Canthocamptus palustris* has a distribution extending from Shetland to the Scilly Islands it does not appear to be very common. Its usual habitat is in ponds and

\* "The Entomostraca of Epping Forest, Part II.," The Essex Naturalist, vol. x. p. 260, tab. i. (1898).

† "Entomostraca of North Wales," Journ. Quekett Microscopical Club, ser. ii. vol. vi. p. 135 (Nov. 1895).

marshes within reach of the sea. It was taken by Dr. G. S. Brady in a brackish-water pond at St. Mary (Scilly), also in the vicinity of the River Stour at Manningtree, and in Oulton Broad (Suffolk); and the Rev. A. M. Norman obtained it at Isle Oronsay, Skye. I found *Canthocamptus palustris* in 1890 in shore-pools on May Island, Firth of Forth; the same species occurred in a gathering of Entomostraca sent to me from Shetland by Mr. Robert Duthie, Fishery Officer, collected in the Loch of Beiton in Unst in 1895; this loch is situated somewhat above high-water mark, and at that time the water it contained, if at all brackish, was only slightly so. In 1896 *C. palustris* was taken with other brackish-water forms in gatherings from shore-pools near Langbank and near Dumbarton, Firth of Clyde, and in 1898 in a gathering from shore-pools at Hunterston, also in the Clyde district.

*Canthocamptus Schmeilii*, Mrazek.

1893. *Canthocamptus Schmeilii*, Mrazek, "Beitrag zur Kenntniss der Harpacticidenfauna des Süsswassers," Zool. Jahrb. sieb. Bd. p. 116, t. vii. figs. 107-117.  
 1895. *Canthocamptus Schmeilii*, T. & A. Scott, Ann. Scot. Nat. Hist. (Oct. 1895), p. 234, pl. iv. figs. 1-13.

Though this species resembles those previously mentioned in having the inner branches of the first pair of thoracic feet longer than the outer branches, it differs in having these branches composed of two subequal joints, instead of being three-jointed. *C. Schmeilii* appears to be moderately rare in the lochs of Scotland. The only records I possess are as follow:—Loch Leven, Kinross, collected in June 1890, but not described till 1895 (in this gathering the species was moderately frequent); Park Loch, near Campbeltown, Cantyre, collected in August 1897; Loch Lomond, near Balmaha, collected in June 1898.

*Canthocamptus crassus*, G. O. Sars.

1863. *Canthocamptus crassus*, G. O. Sars, "Overs. indenl. Ferskv.-Copep." Vidensk. i Christiania Förhandl. for 1862 (Afttr.), p. 23.  
 1880. *Attheyella spinosa*, Brady, Mon. Brit. Copep. vol. ii. p. 58, pl. xliii. figs. 15-18, pl. xlvi. figs. 13-18.  
 1893. *Attheyella spinosa*, T. Scott, Eleventh Rep. Fishery Board for Scotland, pt. iii. p. 225, pl. vi. figs. 11-20.  
 1893. *Canthocamptus crassus*, O. Schmeil, Deutschl. freileb. Süssw.-Copep., ii. Teil, Harpact. p. 37, t. iv. figs. 1-13.

In this species, though the inner branches of the first thoracic feet are three-jointed, they are comparatively short, being only slightly longer than the outer branches.

*Canthocamptus crassus* appears to be generally distributed and moderately frequent in most of our inland waters from Unst to Land's End, and it is one of the more easily recognized forms.

I am in doubt as to whether this species should be ranked among the members of the present genus; but as it seems to be equally out of place in any of the other groups of *Canthocamptinæ*, I thought it was better to leave it in the genus to which G. O. Sars assigned it.

#### Genus NITOCRA, Boeck.

The species included under this genus resemble very closely some of those in the genus *Canthocamptus*. The antennules are usually eight-jointed; the secondary branches of the antennæ are small and one-jointed; the mandible-palp is two-jointed, and the inner branches of the first pair of thoracic feet, which are not much longer than the outer branches, are three-jointed and *prehensile*. The inner branches of the next three pairs are also composed of three joints. The *prehensile* character of the inner branches of the first pair appears to constitute the chief point of difference between *Nitocra* and *Canthocamptus*. One British freshwater Harpacticid has been assigned to this genus.

#### *Nitocra hibernica* (G. S. Brady).

1880. *Canthocamptus hibernicus*, G. S. Brady, Mon. Brit. Copep. vol. ii. p. 52, pl. xlv. figs. 1-12.

1893. *Nitocra hibernica*, Schmeil, Deutschl. freileb. Süßsw.-Copep., ii. Teil, Harpact. p. 78, t. vii. figs. 1-16.

I do not at present know of any Scottish station for this species. Prof. G. S. Brady states that specimens were sent to him by the late David Robertson of Millport, who found them plentifully in Mullingar Canal at Dublin and in a lake near Newport, Co. Mayo. Mr. D. J. Scourfield has taken *Nitocra hibernica* in a pond near London\*.

#### Genus ATTHEYELLA, G. S. Brady, 1880.

The species included here under *Attheyella* have the antennules short and usually eight-jointed; the secondary branches of the antennæ are small and one- (rarely two-) jointed; mandible-palp small and composed of two articulations; inner branches of first pair of feet scarcely, if at all,

\* "Entomostraca of Epping Forest, Part II.," The Essex Naturalist, vol. x. p. 260, tab. i. (1898).



longer than the short outer branches, and composed of *two subequal joints*; inner branches of the second, third, and fourth pairs two-jointed, *first joint small*.

*Attheyella pygmæa* (G. O. Sars).

1863. *Canthocamptus pygmæus*, G. O. Sars, "Overs. indenl. Ferskv.-Copep.," Vidensk.-Selsk. i Christiania Förhandl. 1862 (Afr.), p. 21.  
 1880. *Attheyella cryptorum*, Brady, *op. cit.* vol. ii. p. 60, pl. lii. figs. 1-18.  
 1893. *Attheyella cryptorum*, T. Scott, Eleventh Rep. Fishery Board for Scotland, pt. iii. p. 225, pl. vi. figs. 21-31.

This small species appears to be generally distributed and of frequent occurrence in the inland waters of the British Islands. It may be distinguished from the closely allied species *Attheyella Zschokkei* (Schmeil) by the long curved terminal setæ of the outer branches of the fourth pair of thoracic feet and by the depressed opercular plates.

*Attheyella Zschokkei* (Schmeil).

1893. *Canthocamptus Zschokkei*, Schmeil, Copep. des Rhätikon-Gebirges, pp. 31-36, Taf. iii.  
 1893. *Attheyella propinqua*, T. Scott, Eleventh Rep. Fishery Board for Scotland, pt. iii. p. 227, pl. vii. figs. 1-11.

This species, which may readily be mistaken for the one previously described, appears to have an equally extensive distribution, but it is not so frequently met with. There are, however, comparatively few of the Scottish lochs which I have examined where it has been entirely absent. Mr. D. J. Scourfield has taken *A. Zschokkei* near London. In this species the terminal setæ of the outer branches of the fourth feet have not the long, slender, curved ends so characteristic of *A. pygmæa*, but the opercular plate is more prominent. Dissection shows, of course, other points of difference, but the differences just referred to may be seen without dissection and with the aid of a hand-lens.

*Attheyella Duthiei*, T. & A. Scott.

1895. *Attheyella Duthiei*, T. & A. Scott, Ann. & Mag. Nat. Hist. (6) vol. xviii. p. 4, pl. ii. figs. 1-13; also Fourteenth Rep. Fishery Board for Scotland, pt. iii. p. 241, pl. ix. figs. 1-11.  
 1902. *Canthocamptus Duthiei*, Lilljeborg, "Synop. Spec. hucusque in aquis dulcibus Sueciæ observ. Fam. Harpactic.," K. Sv. Vet.-Akad. Handlingar, Bd. xxxvi. no. 1, p. 41, pl. iii. figs. 5-10.

Though the distribution of this species appears to be extensive, it has not been very frequently met with. It was

obtained in one or two small lochs in Shetland in 1894 by Mr. Robert Duthie, Fishery Officer, who was at that time stationed there. It was collected by myself in Loch Leven, Kinross, in 1890 (but not determined till 1895), and again in 1897 and 1898, and these are the only British localities for this species known to me. The discovery of it in Sweden by Prof. Lilljeborg is very interesting and indicates an extensive distribution for the species.

*Attheyella rhætica* (Schmeil).

1893. *Canthocamptus rhæticus*, Schmeil, Copepodes des Rhätikon-Gebirges\*, p. 23, t. ii.

1895. *Attheyella MacAndrewæ*, T. & A. Scott, Ann. & Mag. Nat. Hist. (6) vol. xv. p. 457, pl. xvi. figs. 1-6.

I have found this species in only a single Scottish locality, viz. in Lochan-a-Chaite—a small loch on Ben Lawers, Perthshire, situated at an altitude of about 2400 feet above sea-level. Mr. D. J. Scourfield has obtained the same species amongst wet algæ from Cym Glas, Snowdon, North Wales†. In September 1896 I collected in Loch Vennachar, Perthshire, specimens of what appeared to me at the time to be a variety of *Attheyella rhætica*‡; but these turned out to belong to the next species.

*Attheyella cuspidata* (Schmeil).

1893. *Canthocamptus cuspidatus*, Schmeil, *op. cit.* p. 36, t. iv.

1897. *Canthocamptus cuspidatus*, T. Scott, Fifteenth Rep. Fishery Board for Scotland, pt. iii. p. 323, pl. ix. figs. 21, 22.

This species has been obtained in Loch Vennachar, Perthshire, and Loch Fad, in Bute; also in Loch of Tingwall (Scalloway) and Loch of Brough (Bressay), both in Shetland. It was taken in Loch Etichan and in Loch-an-eion, Aberdeenshire, in 1898, by Mr. R. M. Clark, B.Sc., F.L.S. Loch Etichan is situated to the northward of Braemar, the other is a small loch on the north-west shoulder of Lochnagar, in West Aberdeenshire§.

Genus MORARIA, T. & A. Scott (March 1893).

Syn. *Ophiocamptus*, Mrazek.

The Harpactids included under *Moraria* have *seven-jointed*

\* Abhandl. d. naturf. Gesellschaft zu Halle, Bd. xix.

† "Entom. of North Wales," Journ. Quekett Microscopical Club, ser. ii. vol. vi. p. 10 (separate copy).

‡ Fourteenth Rep. Fishery Board for Scotland, pt. iii. p. 169 (1896).

§ 'Annals of Scottish Natural History,' July 1901, p. 160.

*antennules* ; the secondary branches of the antennæ are small and one-jointed ; the mandible-palp is small and composed of two joints, the end one being smaller than the other ; the first pair of thoracic feet are short, the two branches are subequal in length, and the inner branches are two-jointed, as in *Attheyella*, the end-joint being the shortest ; the inner branches of the next three pairs are short and consist of *two subequal joints*.

*Moraria brevipes* (G. O. Sars).

1863. *Canthocamptus brevipes*, G. O. Sars (non Mrazek & Scott), *op. cit.* p. 24.  
 1839. *Canthocamptus gracilis*, S. A. Poppe (non *C. gracilis*, G. O. Sars), Abhandl. d. naturwiss. Vereine zu Bremen, Bd. x. p. 544, t. viii. figs. 5-9.  
 1893. *Moraria Anderson-Smithi*, T. & A. Scott, Ann. & Mag. Nat. Hist. (6) vol. vi. (March 1893) p. 213, pl. viii.  
 1893. *Ophiocamptus Sarsi*, Mrazek, "Beitrag zur Kenntniss der Harpacticidenfauna des Süßwassers," Zool. Jahrb. (May 1893), Abth. f. Syst., Geogr. u. Biol. d. Thiere, 7ter Bd. p. 113, t. v. figs. 60-65.  
 1893. *Ophiocamptus Sarsi*, Schmeil, Deutschl. freileb. Süßw.-Copep., ii. Teil, Harpact. p. 86, pl. vi. figs. 1-16.  
 1900. *Moraria Sarsi*, W. Hartwig, "Die freileb. Copep. der Provinz Brandenburg," Forschungsber. der Biol. Stat. z. Plön (Separat-abdruck), p. 11.

This species has been obtained in lochs in Unst and elsewhere in Shetland ; in Barra and North Uist, Outer Hebrides. It was obtained in Loch Morar, Inverness-shire, Loch Doon, Ayrshire, and other lochs in the west of Scotland ; and in lakes in Aberdeenshire, Midlothian, and elsewhere in the east of Scotland. Mr. D. J. Scourfield has also taken it near London.

According to Lilljeborg\* the form described by Herr Al. Mrazek and myself under the name of *Moraria* (*Ophiocamptus*) *brevipes* (G. O. Sars) is not the species described by Sars under that name, the true *Canthocamptus brevipes*, G. O. Sars, being, on the contrary, the form described by me under the name of *Moraria Anderson-Smithi*, and by Mrazek under the name of *Ophiocamptus Sarsi*. It is interesting to note that this species, which is still retained in the genus *Canthocamptus* by Prof. Lilljeborg, was, by Mrazek and myself, unknown to each other, considered to be sufficiently distinct from the typical *Canthocamptus* to warrant its removal to another genus.

\* 'Svenska arter af. Familien Harpacticidæ,' pp. 44-48 (1902).

*Moraria Mrazeki*, T. Scott (new name).

1893. *Ophiocamptus brevipes*, Mrazek (not Sars), "Beitrag zur Kenntniss der Harpact.-fauna des Süsswassers," Zool. Jahrb. 7ter Bd. p. 116, t. v. fig. 66, t. vi. figs. 67-70.  
 1895. *Ophiocamptus brevipes*, T. Scott, Thirteenth Rep. Fishery Board for Scotland, pt. iii. p. 254, pl. x. figs. 1-9.  
 1897. *Moraria brevipes*, T. Scott, Fifteenth Rep. Fishery Board for Scotland, pt. iii. p. 325.

As this is not the *Canthocamptus brevipes* of G. O. Sars, the species will require to be renamed, and I propose that *Mrazeki* should be adopted. The species has been obtained in several Scottish lakes; it was first observed in Loch Lubnaig, Perthshire, and afterwards in Rescobie Loch, Loch Balgavie, and Forfar Loch, Forfarshire; Loch Achray, Trossachs; and in Loch Doon, Ayrshire. The recent increase in the interest that is being taken in the examination of the British lochs will probably add to the number of the stations for this as well as the other species recorded here.

*Moraria Poppei* (Mrazek).

1893. *Ophiocamptus Poppei*, Mrazek, *op. cit.* p. 114, t. v. figs. 54-59.  
 1897. *Moraria Poppei*, T. Scott, Fifteenth Rep. Fishery Board for Scotland, pt. iii. p. 325, pl. ix. figs. 13-20.

This small species appears to be rare; it was first taken in some marshy ground at the side of Loch Fad, in Bute, and afterwards, in 1899, in shore-pools near Hunterston, Firth of Clyde, and in 1901 in marshy ground near Ellon, Aberdeenshire. These are the only British records for this species known to me.

Genus *MARAENBIOTUS*, Mrazek (1893).

This genus was established by Dr. Mrazek for an interesting Harpactid discovered by him in the vicinity of Pribram in Bohemia. The antennules are eight-jointed. The secondary branches of the antennæ are small and two-jointed, the mandible-palp is rudimentary, consisting of a tubercle bearing two or three apical setæ. First pair of thoracic feet short, both branches two-jointed. The inner branches of the next three pairs short, two-jointed, the outer branches longer and three-jointed. Only one species has been described.

*Maraenobiotus Vejdovskyi*, Mrazek.

1893. *Maraenobiotus Vejdovskyi*, Mrazek, *op. cit.* p. 103, t. iv. figs. 17-32, t. v. figs. 33-37.  
 1896. *Maraenobiotus Vejdovskyi*, T. & A. Scott, Ann. & Mag. Nat. Hist. (6) vol. xviii. p. 3, pl. i. figs. 13-21, pl. ii. fig. 23 (July 1896).



This species was obtained for the first time in Scotland in a shore-gathering collected in Loch Vennachar, Perthshire, and afterwards in shore-gatherings collected in Loch Doon, Ayrshire, in December 1897, and in Loch of Park, Aberdeenshire, in 1899. I do not know of any other station for this species in Britain.

Besides the Harpactids mentioned in the foregoing notes, all of which, with one or two exceptions, are usually confined to freshwater localities, there are a considerable number that find a habitat in our brackish-water estuaries, ponds, and marshes; and though these for the most part belong to the same subfamily as those already noticed, they include also representatives of nearly all the subfamilies into which the Harpacticidæ have been divided. And while the Canthocamptinæ comprise most, if not all, the British freshwater Harpactids, the majority of the species belong to the genus *Canthocamptus*, and are, with few exceptions, all freshwater species. But *Canthocamptus hirticornis*, though found in fresh water, occurs also occasionally in water that is slightly brackish; *Canthocamptus palustris*, as has been already mentioned, is usually found in places within the influence of the tide; *Canthocamptus parvus*, T. & A. Scott, and *Canthocamptus propinquus*, T. Scott, are, on the other hand, marine species, and for that reason have been excluded from the preceding notes. *C. propinquus* has been obtained in the Moray Firth and the Firth of Forth, and appears to be moderately rare; *C. parvus* appears to be more generally distributed; the antennules of these two species are composed of six joints instead of eight or nine, but otherwise there is nothing to distinguish them from typical freshwater species. For these and other reasons the line dividing the freshwater species from brackish-water forms, and these again from marine, is at best somewhat arbitrary.

#### ADDITIONAL NOTE.

After the preceding notes had been forwarded to the printers I received a letter from my kind friend the Rev. A. M. Norman, in which he refers, among other things, to the two freshwater Harpactids *Canthocamptus staphylinus* (Jurine) and *Canthocamptus minutus*, Claus; and as his remarks on these two species should be of interest to students of the freshwater Copepoda, I have, with his permission, transcribed them here.

Referring to *Canthocamptus staphylinus*, he says:—"O. F.

Müller described *Cyclops minutus* in 1776 and 1785, which afterwards became *Canthocamptus minutus* of Baird, Fischer, and Lilljeborg; Claus for this name substituted that of Jurine—*Monoculus staphylinus* (1820)—and then immediately after described another *Canthocamptus minutus* of his own. Now it will be admitted that, though without the detailed drawings of Jurine, Müller's figures of *C. minutus* are excellent representations for the time of a *Canthocamptus*, and if not sufficient to distinguish it from some recent species, the name ought to be retained for that species which is the most common and the first determined. Therefore I consider that *C. staphylinus* (Jurine) should become a synonym of *Canthocamptus minutus* (O. F. Müller), and that *C. minutus*, Claus—a name he should not have employed, on account of confusion with Müller's species,—will have to give way to Rehberg's more recent name *C. lucidulus*.

"That author was quite right in restoring the name of Müller's to Jurine and Claus's *C. staphylinus*, and substituting for Claus's *C. minutus* his new name of *Canthocamptus lucidulus*."

I may add that, though I leave my notes on these two species as they were written, I quite agree with the Rev. A. M. Norman that O. F. Müller's name should be restored, that *C. staphylinus* (Jurine) should become a synonym of *C. minutus* (Müller), and consequently that *C. minutus*, Claus, will become a synonym of *C. lucidulus*, Rehberg.

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XXII—*Descriptions of some new Species of Lepidoptera, chiefly from South America.* By HERBERT DRUCE, F.L.S.

Fam. Syntomidæ.

*Isanthrene joda*, sp. n.

*Male*.—Head, antennæ, tegulæ, thorax, and legs black, collar and middle of thorax dark blue; abdomen black, the first four segments edged with yellow, the anal segments banded with dark blue. Primaries yellowish hyaline, the base and inner margin black, the apex broadly black, the fringe black: secondaries yellowish hyaline, the costal and outer margin edged with black; fringe black.

Expanse 2 inches.

*Hab.* Peru, Cuzco (*Mus. Druce*).

*Argyroeides lydia*, sp. n.

*Male*.—Head, thorax, and abdomen black above, pale yellow on the underside; the collar, tegulæ, and base of thorax yellow; abdomen banded with yellow; antennæ black; legs yellow. Wings yellowish hyaline, the costal margin of primaries edged with black, veins yellowish brown. —*Female* very similar to the male, but with the primaries clouded with yellowish brown; the tip of the antennæ yellow.

Expanse, ♂ 1, ♀  $1\frac{1}{4}$  inch.

*Hab.* South Brazil, Rio Grande do Sul (*Mus. Druce*).

## Fam. Arctiadae.

*Automolis troias*, sp. n.

*Female*.—Head, antennæ, collar, tegulæ, and thorax white, tegulæ streaked with pale brown; abdomen chrome-yellow, the sides and underside white; a white spot on the first and second segments of the abdomen. Primaries pale greyish brown, the costal margin edged with white; a large hyaline spot beyond the cell, edged with a waved white line, which extends from the costal margin almost to the inner margin, the apex white: secondaries pale whitish brown, the outer margin bordered with darker brown from the apex to the anal angle, the inner margin yellow; a large round brown spot at the end of the cell; the fringes of both wings pale brown.

Expanse 2 inches.

*Hab.* South Brazil, Rio Grande do Sul (*Mus. Druce*).

## Fam. Cyllopodidae.

*Flavinia superba*, sp. n.

*Male*.—Head, antennæ, and thorax black; collar chrome-yellow; abdomen yellow; anus and legs black. Primaries chrome-yellow, the costal margin, apex, and outer margin deep black, the end of the cell black: secondaries chrome-yellow, edged with deep black from the apex to the anal angle. Underside the same as the upperside.

Expanse  $1\frac{3}{4}$  inch.

*Hab.* Peru, Cuzco (*Mus. Druce*).

A very distinct species allied to *Flavinia alcidamia*, Druce, from Ecuador.

*Darna conscita*, sp. n.

*Male*.—Head, antennæ, collar, tegulæ, thorax, and abdomen black; legs black. Primaries deep chrome-yellow, the apical third of the wing deep black; the inner margin black, broadest in the middle: secondaries black, slightly greyish in the cell; the fringes of both wings black.

Expanse  $1\frac{3}{4}$  inch.

*Hab.* Peru, Chanchamayo, Upper Rio 'Toro (*Mus. Druce*).

A very distinct species of which both sexes are alike.

*Devara semidolens*, sp. n.

*Male*.—Head white, collar black; tegulæ black, streaked with white; thorax and abdomen black, a white line down the middle from the base to the anus; the underside of the abdomen greyish white; legs black, streaked with white. Primaries black; a wide white streak from the base almost to the middle of the wing; a square white spot nearest the apex; the fringe black: secondaries cream-colour, broadly bordered with black from the apex to the anal angle. Underside: primaries very similar to the upperside, but with the costal margin and apex greyish, crossed by black veins: secondaries yellowish white, with all the veins black, slightly dusky at the apex.

Expanse  $1\frac{3}{4}$  inch.

*Hab.* Peru, Upper Rio Toro, Chanchamayo (*Mus. Druce*).

This species is allied to *Devara chepta*, Druce.

## Fam. Lasiocampidæ.

*Ormiscodes fornax*, sp. n.

*Male*.—Head, collar, tegulæ, thorax, and abdomen black, the abdomen clothed with long greyish hairs; the legs black; antennæ yellowish brown. Primaries pinkish brown, thickly irrorated with grey scales; the base, a large elongated spot about the middle of the costal margin, and a round spot at the lower corner of the cell all black; the fringe reddish brown: secondaries blackish brown, broadly bordered with pinkish brown, irrorated with grey scales; a submarginal, narrow, dark brown line extends from the apex to the anal angle. Underside of both wings uniformly grey-brown, crossed about the middle by a narrow greyish-white line.

Expanse  $4\frac{1}{4}$  inches.

*Hab.* South Brazil, Rio Grande do Sul (*Mus. Druce*).

This species is allied to *Ormiscodes thliptophana*, Felder, from the Amazons.



**Fam. Notodontidæ.**

*Rosema lucia*, sp. n.

*Male*.—Head and tegulæ green; antennæ and thorax pale fawn-colour; abdomen above bright orange-red, the underside yellowish white; the underside of the thorax and legs reddish. Primaries whitish green, with a black dot at the end of the cell surrounded with white; a white streak on the inner margin close to the base; fringe green: secondaries white, shaded with yellow along the inner margin; the fringe white. The underside of the primaries greenish white, the costal margin bright orange-red nearly to the apex; secondaries white.

Expanse  $1\frac{3}{4}$  inch.

*Hab.* S. Brazil, Rio Grande do Sul (*Mus. Druce*).

*Rosema vitula*, sp. n.

*Male*.—Head, antennæ, and thorax brown; tegulæ green; abdomen brownish white; legs pale brown. Primaries dull green, the costal margin white; fringe green: secondaries white. Underside of both wings greenish white, the costal margin of the primaries yellow.

Expanse  $1\frac{1}{2}$  inch.

*Hab.* Venezuela, Merida (*Mus. Druce*).

*Rosema eurytis*, sp. n.

*Male*.—Head white; antennæ, thorax, and abdomen brown; tegulæ green; legs whitish brown. Primaries dark green, the costal margin white; a white spot in the cell; the apex and part of the outer margin dark brown: secondaries dark brown, whitish close to the base; the fringe of both wings brown. Underside yellowish white, much clouded with dark brown.

Expanse  $1\frac{1}{2}$  inch.

*Hab.* Venezuela, Merida (*Mus. Druce*).

**Fam. Noctuidæ.**

*Lycophotia atristriata*, sp. n.

*Female*.—Head, thorax, and tegulæ black, tegulæ edged with fawn-colour; antennæ black from the tip to beyond the middle, the base fawn-colour; abdomen pale fawn-colour, the anal segments the darkest; underside of the abdomen and legs blackish brown. Primaries fawn-colour, striped with

black from the base to the outer margin; fringe fawn-colour: secondaries greyish white, shaded at the apex with pale brown; the outer margin brown; the fringe greyish.

Expanse  $1\frac{1}{2}$  inch.

*Hab.* Brazil, Parana (*Mus. Druce*).

*Euthisanotia semiviridis*, sp. n.

*Male*.—Head, antennæ, collar, tegulæ, thorax, and abdomen black; a white line on the upperside of the abdomen, extending from the base to the anus, the underside banded with white, the legs black. Primaries olive-green, broadly bordered with black; two fine white lines extend from the apex round the outer margin to the base of the wing; a rather large dentated white band nearly crosses the wing beyond the cell almost to the inner margin; the veins near the base of the wing irrorated with white; the fringe black, excepting near the anal angle, where it becomes greyish: secondaries dark grey, broadly bordered with black, the veins black and the fringe white. The underside very similar to the upperside, but whiter, and the black marking more distinct.—The *female* almost identical with the male.

Expanse, ♂  $1\frac{3}{4}$ , ♀ 2 inches.

*Hab.* Peru, Cuzco (*Mus. Druce*).

*Richia carnea*, sp. n.

*Male*.—Head, antennæ, collar, tegulæ, and thorax reddish fawn-colour; abdomen above whitish fawn-colour, palest at the base; underside of the thorax, abdomen, and legs reddish fawn-colour. Primaries reddish fawn-colour, with four black spots along the costal margin; a short greyish streak from the base of the wing, with two small black dots on the upperside of the streak; the fringe reddish fawn-colour: secondaries pure white, the fringe white.

Expanse  $1\frac{3}{4}$  inch.

*Hab.* Chili (*Edmonds, Mus. Druce*).

*Timora albiseriata*, sp. n.

*Male*.—Head, collar, tegulæ, and thorax pale yellowish cream-colour; abdomen and legs rather darker; the anal tuft yellow. Primaries cream-colour, clouded with pink from the base to the middle; a rather wide pink band, edged with white on the inner side, extends from the apex to the inner margin near the anal angle; the fringe cream-colour: secondaries nearly white, slightly shaded with yellow at the apex

and round the outer margin.—*Female* very similar to the male, but slightly darker in colour.

Expanse, ♂ ♀,  $\frac{3}{4}$  inch.

*Hab.* West Africa, Gambia (*Mus. Druce*).

*Timora metarhoda*, sp. n.

*Female*.—Head, antennæ, collar, tegulæ, thorax, abdomen, and legs brownish yellow. Primaries dull yellow; a narrow pink line extends from the base of the wing to the end of the cell; a small white dot in the middle of the cell; a pink band enclosing a row of minute white dots crosses the wing from the apex to the middle of the inner margin; the fringe pink: secondaries pale brownish yellow, shaded with pink from the apex to the anal angle; the fringe white.

Expanse 1 inch.

*Hab.* W. Africa, Gambia (*Mus. Druce*).

*Thyria eubotes*, sp. n.

*Male*.—Head, antennæ, thorax, and tegulæ dark brown; abdomen pale brown; legs brown; the underside of the thorax whitish. Primaries dark brown, with several very minute golden spots at the end of the cell and a row of small golden spots at the apex; between the end of the cell and the anal angle are several very indistinct small black spots; the fringe dark brown: secondaries chrome-yellow, very broadly bordered with black; the fringe yellowish brown. The underside of the primaries uniformly reddish brown, with several small white dots along the costal margin; secondaries very similar to the upperside, but slightly greyish along the costal margin.

Expanse  $1\frac{1}{4}$  inch.

*Hab.* Colombia, Minca, 2000 feet (*Mus. Druce*).

*Thyria meres*, sp. n.

*Male*.—Head, antennæ, collar, tegulæ, and thorax brown; abdomen yellow, brown on the underside; a central row of brown scales extends from the base to the anus; the anal tuft black; legs reddish brown. Primaries dark brown, crossed from the costal to the inner margin with paler brown waved lines; a large cluster of silver spots at the end of the cell and at the apex: secondaries yellow, bordered with blackish brown. Underside of the primaries pale brown, yellow at the base; several white dots at the anal angle: secondaries pale yellow, with the costal margin, apex, and outer margin

greyish brown; the fringe yellow.—*Female* very similar to the male, but considerably darker in colour on the underside.

Expanse, ♂ ♀,  $1\frac{1}{4}$  inch.

*Hab.* Colombia, Minca, 2000 feet; Ecuador, Sarayacu (*C. Buckley, Mus. Druce*).

*Thyria scione*, sp. n.

*Male*.—Head, antennæ, collar, tegulæ, thorax, abdomen, and legs pale reddish brown. Primaries pale reddish brown, crossed by pale brown lines; a cluster of silvery-white spots at the end of the cell and a large silvery-white spot at the apex, below which are several smaller silvery-white spots: secondaries white, bordered with pale reddish brown. Underside: primaries and secondaries silvery white, the costal margin of the primaries shaded with pale reddish brown.

Expanse  $1\frac{1}{6}$  inch.

*Hab.* Antioquia, Frontino (*Salmon, Mus. Druce*).

*Thyria phraortes*, sp. n.

*Female*.—Head, antennæ, and thorax brown; collar and tegulæ grey; the abdomen black, the base yellow; underside of the thorax white; legs greyish brown. Primaries brown, the outer margin dark blackish brown; the cluster of silver spots at the end of the cell V-shaped; a large silvery-white spot at the apex, with some very minute ones along the outer margin; the fringe blackish brown: secondaries yellowish white, the outer margin bordered with black. Underside of the primaries dark brownish grey; the costal margin and a submarginal row of spots white; secondaries white, clouded with black at the anal angle and partly round the outer margin; the fringe white.

Expanse  $1\frac{1}{4}$  inch.

*Hab.* S.E. Brazil, Rio Grande do Sul (*Mus. Druce*).

Fam. Pyralidæ.

Subfam. *CHRYSAUGINÆ*.

*Anisothrix nobilis*, sp. n.

*Male*.—Head, antennæ, tegulæ, and thorax pale pinkish brown; abdomen blackish brown; legs dark brown. Primaries dark brown, crossed from the costal to the inner margin by two curved purplish-brown bands, edged with black and white lines; the fringe brown: secondaries black, streaked



with purplish brown near the anal angle; a submarginal white line on the outer margin nearest the anal angle; the fringe blackish brown.

Expanse  $1\frac{1}{4}$  inch.

*Hab.* British Guiana, Bartica (*Parish, Mus. Druce*).

*Chrysauge eutelia*, sp. n.

*Male*.—Head, collar, tegulæ, and thorax bright yellow; antennæ, abdomen, and legs pale yellowish brown. Primaries bright yellow, crossed from the costal to the inner margin by two fine black lines—the first nearest the base, the second beyond the cell; the costal and outer margin edged with black; the fringe blackish brown: secondaries bright yellow, the marginal line and a submarginal line extending from the costal margin near the apex to the anal angle both black; the fringe black.—*Female* similar to the male, but with the abdomen yellow.

Expanse, ♂  $1\frac{4}{10}$ , ♀  $1\frac{3}{4}$  inch.

*Hab.* S. Brazil, Rio Grande do Sul (*Mus. Druce*).

*Chrysauge citrina*, sp. n.

*Male*.—Head, antennæ, collar, tegulæ, thorax, abdomen, and legs chrome-yellow. Primaries and secondaries chrome-yellow, the primaries not quite so bright in colour as the secondaries; the fringes of both wings pale whitish yellow.—*Female* very similar to the male, but considerably paler in colour.

Expanse, ♂  $1\frac{1}{4}$ , ♀  $1\frac{1}{2}$  inch.

*Hab.* S. Brazil, Rio Grande do Sul (*Mus. Druce*).

XXIII.—*Rhynchotal Notes*.—XVI. Heteroptera: *Family Reduviidæ (continued)*, *Apiomerinæ*, *Harpactorinæ*, and *Nabinæ*. By W. L. DISTANT.

THIS communication concludes the examination of Walker's descriptions of genera and species in the family Reduviidæ. All have been allocated with the exception of two examples, viz. *Reduvius pubicollis* and *Prostemma tarsalis*. Both are unique—the first without a locality, the second a carded specimen; further material is therefore required before an accurate determination can be attempted.

*APIOMERINÆ.*Genus *APIOMERUS*.*Apiomerus apicalis*.*Apiomerus apicalis*, Burm. Handb. ii. p. 232 (1835).*Apiomerus subapicalis*, Walk. Cat. Het. viii. p. 72. n. 28 (1873).*Apiomerus nitidicollis*.*Apiomerus nitidicollis*, Stål, En. Hem. ii. p. 99 (1872).*Apiomerus pulchripes*, Walk. Cat. Het. viii. p. 72. n. 26 (1873).*Apiomerus lituratus*.*Apiomerus lituratus*, Stål, En. Hem. ii. p. 99 (1872).*Apiomerus lituratus*, Walk. Cat. Het. viii. p. 71. n. 23 (1873).

It is probable that Stål, on his visit to the British Museum, affixed his MS. name to this species, which he afterwards descriptively published as above. Walker presumably found the name and also described the species. Walker's type represents the variety in which the abdomen beneath is fuscous and the apices of all the femora and the posterior tibiæ and tarsi are ochraceous.

*Apiomerus amazonus*.*Apiomerus amazonus*, Stål, En. Hem. ii. p. 99 (1872).*Apiomerus bipunctatus*, Walk. Cat. Het. viii. p. 70. n. 19 (1873).*Apiomerus geniculatus*.*Apiomerus geniculatus*, Erichs. in Schomb. Reis. Guiana, iii. p. 613 (1848); Stål, En. Hem. ii. p. 96 (1872).*Apiomerus lateralis*, Walk. Cat. Het. viii. p. 71. n. 24 (1873).

The form described by Walker differs from the description of Erichson only in the colour of the connexivum, which is spotted with sanguineous, in some examples almost wholly sanguineous. The same variation, however, is to be found in the allied species *A. nigrilobus*, Stål, the small white spots of the connexivum also sometimes being replaced by sanguineous.

*Apiomerus proteus*.*Apiomerus flavipennis*, Stål, Cefv. Vet.-Ak. Förh. 1855, p. 188.*Apiomerus proteus*, Stål, En. Hem. ii. p. 96 (1872).*Apiomerus tarsalis*, Walk. Cat. Het. viii. p. 72. n. 27 (1873).

## Genus AMAUROCLOPIUS.

*Amauroclopium ornatum* sp. n.

Black, finely greyishly pilose; margins of pronotum narrowly, and two large discal inwardly converging fasciæ on posterior lobe, disk and apex of scutellum, base of rostrum, and some spots at base of femora, luteous; a discal spot on hemelytra near base of membrane, spots to connexivum above and beneath, apices of femora, bases of tibiæ, apices of intermediate and posterior tibiæ, and anal segment, sanguineous; anterior angles of pronotum tuberculously spinous, spines luteous, directed upward and forward; anterior femora long and curved, membrane passing apex of abdomen.

Long. 19 millim.; exp. pronot. angl. 6 millim.

*Hab.* Interior of Brazil (Brit. Mus.).

## Genus HENIARTES.

*Heniartes productus*.

*Heniartes productus*, Stål, Öfv. Vet.-Ak. Förh. 1866, p. 248.

*Apiomerus xanthospilus*, Walk. Cat. Het. viii. p. 71. n. 22 (1873).

Walker omitted to describe the following characters in his type:—Anterior tibiæ black for more than half their length and apices of posterior tibiæ also black.

## HARPACTORINÆ.

## Genus HARPACTOR.

*Harpactor fuscipes*.

*Reduvius fuscipes*, Fabr. Mant. Ins. ii. p. 312. 33 (1787).

*Harpactor bicoloratus*, Kirby, Journ. Linn. Soc., Zool. xxiv. p. 120 (1891).

*Harpactor marginatus*.

*Reduvius marginatus*, Fabr. Ent. Syst., Suppl. p. 196. n. 12 (1798).

*Sycanus? militaris*, Kirby, Journ. Linn. Soc., Zool. xxiv. p. 119 (1891).

*Harpactor picturatus*, sp. n.

Head black, ochraceous beneath and at the apical lateral margins; rostrum ochraceous, second and third joints piceous, base of second joint ochraceous; pronotum ochraceous, the anterior lobe sanguineous, its base and central longitudinal sulcation black, its anterior angles and margin ochraceous; scutellum black, apex and apical margin ochraceous; corium sanguineous, a central marginal spot and the apex black;

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clavus and membrane bronzy-brown ; body beneath and legs ochraceous, anterior and central areas of meso- and metasterna, margins of abdominal segments, lateral marginal abdominal spots, upper surfaces of anterior and intermediate femora, a central spot and apex above of posterior femora, tibiæ, and tarsi black ; a sanguineous marginal spot on fourth, fifth, and sixth abdominal segments ; antennæ mutilated. First and second joints of the rostrum subequal in length or second slightly longer than the first ; ante- and postocular portions of the head about equal, or postocular area slightly longer than the anteocular area ; membrane extending considerably beyond abdominal apex ; head very little shorter than pronotum ; posterior pronotal lobe much longer than anterior lobe.

Long. to apex of membrane 13 millim.

*Hab.* Brit. East Africa : Machakos (*S. L. Hinde*, Brit. Mus.).

Allied to *H. rapax*, Stål.

*Harpactor ornatellus*, sp. n.

Pale luteous ; head above, antennæ, apex of rostrum, transverse constriction and central sulcation to anterior lobe of pronotum, basal area of scutellum, apical angle of corium, a line on each side of head beneath behind eyes, disk and a transverse spot at base of mesosternum, margins of abdominal segments, apices of femora, the tibiæ, and tarsi black ; lateral apical margins of head ochraceous ; abdominal segments beneath with broad, transverse, sanguineous fasciæ. Rostrum with the second joint longer than the first ; head shorter than pronotum ; posterior pronotal lobe nearly twice as long as the anterior lobe ; membrane considerably passing abdominal apex.

Long. to apex of membrane 13 millim.

*Hab.* East Africa : Ruwenzori (*Scott Elliot*, Brit. Mus.).

*Harpactor flavus*, sp. n.

Posterior lobe of pronotum and body beneath pale luteous ; head above, antennæ, rostrum, a fascia on each side of head beneath behind eyes, anterior area of prosternum, disks of meso- and metasterna, coxæ, and legs black ; abdomen beneath with black, lateral, segmental, transverse fasciæ, sometimes with only two or three black marginal spots ; scutellum black, with the apex luteous ; corium brownish ochraceous or pale piceous ; membrane bronzy brown ; connexivum luteous, spotted with black. Rostrum with the



second joint much longer than the first; postocular portion of the head a little longer than the anteocular portion; head about as long as the pronotum; posterior pronotal lobe not quite twice as long as anterior lobe.

Long. to apex of membrane 10-11 millim.

*Hab.* Hong Kong (Brit. Mus.); Burma (Coll. Dist.).

Allied to *H. nigricollis*, Dall.

*Harpactor chersonesus*, sp. n.

Black; anterior margin and posterior lobe of pronotum, head beneath, sternum, coxæ, and abdomen luteous; disk of posterior lobe of pronotum macularly infuscate; sternal and abdominal segmental margins black; apical marginal area of the corium dull reddish; membrane semihyaline, piceous at base; antennæ piceous, first joint (excluding base and apex) brownish ochraceous; rostrum piceous, its second joint ochraceous at base and longer than first joint; head about as long as pronotum, the postocular longer than the anteocular portion.

Long. 10 millim.

*Hab.* Penang (*H. N. Ridley*, Brit. Mus.); Burma (Coll. Dist.).

In some specimens the posterior pronotal lobe is unicolorous, the disk not macularly infuscate; the width of the pale frontal margin to the anterior pronotal lobe is variable; in one specimen from Burma the femora are obscurely dull ochraceously biannulate.

Genus VESBIUS.

*Vesbius nitidus*.

*Apiomerus nitidus*, Walk. Cat. Het. viii. p. 70. n. 20 (1873).

The type is without locality, but I have received the species from North Borneo.

Genus GRAPTOCLOPIUS.

*Graptoclopius helluo*.

*Reduvius helluo*, Stål, Ann. Soc. Ent. Fr. 1863, p. 39.

In his diagnosis of this species (type in Brit. Mus.) Stål omitted to include the anterior legs with the other details he described as "lutescentibus."

*Graptoclopius pallescens*, sp. n.

Head, antennæ, rostrum, pronotum, and anterior legs  
15\*

reddish ochraceous; apex of first and the whole of the remaining joints of antennæ, scutellum, corium, membrane, connexivum, coxæ, intermediate and posterior legs, lateral areas of meso- and metasterna, and anal segment of abdomen black; two somewhat broad annulations to intermediate and posterior femora, head, sternum, and abdomen beneath luteous; apices of intermediate and posterior tibiæ brownish ochraceous. Body pilose; head and pronotum prominently, and legs, especially basal areas of tibiæ, longly pilose; discal sulcation to pronotum distinct and profound; head longer than posterior lobe of pronotum. In fresh specimens the disk of the corium is suffused with cretaceous white.

Long. 18-20 millim.

*Hab.* New Guinea; Dorey; Ké Islands (*Wallace*, Brit. Mus.).

### Genus BIASTICUS.

*Biasticus Horsfieldi*, sp. n.

♂. Black; a lateral spot on each side of head in front of eyes, head beneath, posterior margins of first and second abdominal segments, linear spots to connexivum above and beneath, lateral margins of apical abdominal segment, and anterior margin of anal segment luteous; margins of third, fourth, and fifth abdominal segments brownish ochraceous; antennæ piceous, first joint (excluding base and apex) brownish.

♀. Abdomen with about the apical fourth sanguineous.

Head with the postocular portion a little longer than the anteocular; first joint of the rostrum a little shorter than the second; anterior pronotal lobe profoundly centrally sulcate, posterior lobe distinctly ridged on anterior disk; body and legs finely pilose; femora obscurely apically nodulose.

Long. 10½ millim.

*Hab.* Java (*Horsfield*, Brit. Mus.).

### Genus SPHEDANOLESTES.

*Sphedanolestes subflaviceps*.

*Harpactor subflaviceps*, Sign. Ann. Soc. Ent. Fr. 1860, p. 965; Leth. & Sev. Cat. Gén. Hém. t. iii. p. 162 (1896).

*Reduvius gulosus*, Stål, Hem. Afr. iii. p. 91 (1865).

*Sphedanolestes bicoloripes*.

*Reduvius bicoloripes*, Dist. Trans. Ent. Soc. 1881, p. 106.

*Harpactor bicoloripes*, Leth. & Sev. Cat. Gén. Hém. t. iii. p. 158 (1896).

*Sphedanolestes melanocephalus*.

*Reduvius? melanocephalus*, Stål, Ann. Soc. Ent. Fr. 1863, p. 39. (Type in Brit. Mus.)

*Sphedanolestes signatus*, sp. n.

Black; disk of posterior lobe of pronotum, lateral areas of prosternum, connexivum, and abdomen beneath pale creamy luteous; corium luteous, with the veins black; membrane pale bronzy. Postocular portion of the head much longer than the anteocular portion; second joint of the rostrum much longer than the first; head about as long as the pronotum; posterior pronotal lobe broadly sulcated, anterior lobe finely deeply sulcate; posterior pronotal angles subprominent, rounded.

Long. to apex of membrane  $8\frac{1}{2}$  millim.

*Hab.* S. India: Utakamand (Atkins. Coll., Brit. Mus.).

*Sphedanolestes stigmatellus*, sp. n.

Black; anterior area of posterior pronotal lobe, lateral area of corium, posterior margin of prosternum, anterior coxæ, and disk of abdomen beneath sanguineous; head beneath, a spot near both the intermediate and posterior coxæ, abdominal margin, and a submarginal series of large subquadrate spots very pale luteous; the abdominal margin black at incisures on posterior half and the submarginal spots margined with black. Greyishly pilose; head about as long as pronotum; second joint of rostrum considerably longer than the first; sulcation to anterior lobe of pronotum profound, posterior lobe broadly and much more obscurely sulcate.

Long. 8 millim.

*Hab.* S. India: Utakamand (Atkins. Coll., Brit. Mus.).

*Sphedanolestes incertis*, sp. n.

Black; lateral margins of head between eyes and bases of antennæ, anterior pronotal lobe, lateral and basal margins of posterior pronotal lobe, narrow lateral and apical margins to corium, marginal spots and sometimes lateral margin above and beneath to connexivum, head beneath, coxæ, and trochanters sanguineous. Second joint of rostrum much longer than first; head a little shorter than pronotum; posterior disk of pronotum centrally sulcate, in some specimens obscurely sulcate; body and legs pilose; femora somewhat obscurely nodulose near apex.

Long. 15-16 millim.

*Hab.* China: Kualun, N.W. Fokien (*J. de La Touche*, Brit. Mus.); Kiukiang (*Pratt*, Brit. Mus.). Japan (*Lewis*, Coll. Dist.).

In some specimens the lateral areas of the anal abdominal segment are sanguineous.

*Sphedanolestes funeralis*, sp. n.

Black; trochanters sanguineous. Elongate, hirsute; second joint of rostrum longer than the first; head a little shorter than pronotum, the anteocular portion about as long as the postocular portion; posterior lobe of pronotum finely but distinctly sulcate, the posterior angles rounded; membrane passing the abdominal apex. The colour above is somewhat opaque; on the under surface and legs it is shining with an indigo tint.

Long.  $16\frac{1}{2}$  millim.

*Hab.* Kashmir (Brit. Mus.).

*Sphedanolestes elegans*, sp. n.

Luteous; anterior lobe of pronotum, disk of scutellum, corium (sometimes only veins to corium), coxæ, anterior and intermediate femora pale sanguineous; head above, antennæ, second and third joints of rostrum, sulcation to anterior pronotal lobe, a broad subapical fascia to abdomen above and beneath, apices of femora broadly, bases of intermediate and posterior femora narrowly, narrow central annulation to posterior femora, and lateral margins of scutellum, black; membrane piceous, its apex fuliginous.

*Var.*—Posterior femora wholly black; head beneath and first joint of rostrum pale sanguineous.

First joint of rostrum a little shorter than the second; postocular portion of the head a little longer than the anterior portion; sulcation to anterior pronotal lobe profound, disk of posterior lobe distinctly but less profoundly sulcate; femora distinctly sulcate near apices.

Long. 15–16 millim.; exp. pronot. angl. 5 millim.

*Hab.* Brit. East Africa: Samburu (*C. S. Betton*, Brit. Mus.).

*Sphedanolestes ornatellus*, sp. n.

Ochraceous; head above, antennæ, second and third joints of rostrum, sulcation to anterior pronotal lobe, margins of scutellum, membrane, central area of abdomen above and beneath, posterior femora, bases and apices of intermediate femora, apices of anterior femora, tibiæ, tarsi, and narrow



basal fascia to abdomen, black. First joint of rostrum shorter than the second; ante- and postocular portions of head about equal in length; sulcation to central pronotal lobe profound, posterior pronotal lobe distinctly but less profoundly sulcate; femora distinctly sulcate near apices.

Allied to the preceding species (*S. elegans*), but, apart from colour-differences, the lengths of the ante- and postocular portions of the head are relatively different.

Long. 16 millim.; exp. pronot. angl.  $4\frac{1}{2}$  millim.

*Hab.* German East Africa (*Capt. Atkinson*, Brit. Mus.).

#### Genus VELINUS.

##### *Velinus parvus*, sp. n.

Dull dark ochraceous; head above (excluding eyes and base), antennæ, rostrum (excluding apex), corium (excluding extreme base), membrane, tibiæ, and apical halves of femora indigo-black. Pronotum strongly centrally sulcate; legs hirsute; tibiæ narrowed towards apex; femora strongly nodulose before apex; first joint of antennæ about as long as head and pronotum together.

Long. 12 millim.

*Hab.* Borneo: Sarawak (*Shelford*, Brit. Mus.).

#### Genus HÆMATOCHARES.

##### *Hæmatochares longiceps*.

*Prostemma longiceps*, Walk. Cat. Het. vii. p. 137. n. 25 (1873).

#### Genus HOMALOSPHODRUS.

##### *Homalosphodrus abdominalis*, sp. n.

Bluish black; abdomen castaneous, basal segment and somewhat large stigmatal spots black; first and second joints of antennæ, head beneath between eyes, and a subapical annulation to posterior femora luteous; base and apex of first joint of antennæ narrowly black; second and third joints of rostrum castaneous; apex of membrane fuliginous and considerably passing apex of abdomen. Head very elongate, about as long as pronotum and scutellum taken together; first joint of antennæ a little longer than head.

Long. 20 millim.

*Hab.* Cambodia (*Mouhot*, Brit. Mus.).

## Genus SYCANUS.

*Sycanus collaris*.*Reduvius collaris*, Fabr. Spec. Ins. ii. p. 380 (1781).*Sycanus leucomesus*, Walk. Cat. Het. viii. p. 84. n. 31 (1873).*Sycanus fulvicornis*.*Sycanus fulvicornis*, Dohrn, Stett. ent. Zeit. xx. p. 99 (1859).*Sycanus caliginosus*, Walk. Cat. Het. viii. p. 86. n. 37 (1873).*Sycanus annulicornis*.*Sycanus annulicornis*, Dohrn, Stett. ent. Zeit. xx. p. 98 (1859).*Sycanus invisus*, Walk. Cat. Het. viii. p. 87. n. 38 (1873).*Sycanus dichotomus*.*Sycanus dichotomus*, Stål, Öfv. Vet.-Ak. Förh. 1866, p. 277.*Sycanus turbidus*, Walk. Cat. Het. viii. p. 86. n. 36 (1873).*Sycanus versicolor*.*Sycanus versicolor*, Dohrn, Stett. ent. Zeit. xx. p. 96 (1859).*Sycanus miles*, Walk. Cat. Het. viii. p. 86. n. 35 (1873).

## Genus COLPOCHILOCORIS.

*Colpochilocoris horrendus*.*Yolinus horrendus*, Walk. Cat. Het. viii. p. 79. n. 8 (1873).*Colpochilocoris fasciiventris*, Reut. Act. Soc. Sc. Fennic. xii. p. 284 (1881).

## Genus YOLINUS.

*Yolinus glagoviæ*.*Yolinus glagoviæ*, Dohrn, Stett. ent. Zeit. xx. p. 95 (1859).*Yolinus rubrifera*, Walk. Cat. Het. viii. p. 78. n. 6 (1873).

Walker writes that his species may be separated from the one described by Dohrn "by the red hue on both surfaces of the sides of the abdomen and by the wholly black femora." The first character I take to be a misreading of Dohrn and the second is erroneous, as the posterior femora in the two specimens described by Walker are distinctly annulated.

*Yolinus conspicuus*, sp. n.

Black; connexivum with the fifth and sixth segments bright ochraceous; disk of abdomen beneath dull sanguineous; antennæ with the basal joint biannulated with ochraceous;

posterior femora narrowly and obscurely annulated with fuscous a little before apex.

Allied to *Y. baro*, Stål (type in Brit. Mus.), but with the pronotum broader and its posterior angles not subnodulose; connexivum much more widely dilated; body and legs distinctly greyish pilose.

Long., ♀, 24 millim.; max. abd. exp. 13 millim.

*Hab.* Tavoy (Atkins. Coll., Brit. Mus.).

*Yolinus Mouhoti*, sp. n.

Black; pronotum (excluding disk of anterior lobe) and corium (excluding apex) creamy white, densely pilose; lateral dilated lobes of the fifth and sixth abdominal segments pale luteous; abdomen beneath with a double stigmatal series of small whitish spots; femora with a luteous annulation before apices; second joint of rostrum reddish ochraceous; antennæ piceous, basal joint biannulated with ochraceous. Basal joint of antennæ a little longer than head, which has the postocular portion considerably longer than the anteocular portion; abdominal margins lobately and inwardly produced; the lobations strongly inwardly convex; legs somewhat strongly pilose, the femora subapically nodulose.

Long. 17-19 millim.

*Hab.* Cambodia (*Mouhot*, Brit. Mus.).

Genus EULYES.

*Eulyes sanguinolentus*, sp. n.

Black; apex of head from antenniferous tubercles, basal joint of rostrum, anterior pronotal lobe, basal margin and lateral angles of posterior lobe, large subquadrate spots to connexivum above and beneath, posterior area of prosternum, coxæ, trochanters, bases and apices of femora, and the apices of the tibiæ sanguineous or bright reddish ochraceous; antennæ mutilated. Basal joint of rostrum short, not reaching eyes; head about as long as the pronotum; ante- and postocular portions of head about equal in length; pronotum with the disk broadly sulcated; abdomen with small greyish pilose stigmatal spots, its lateral margins broadly and upwardly dilated.

Long. 33 millim.; max. abd. exp. 11 millim.

*Hab.* Tondano (*Wallace*, Brit. Mus.).

[To be continued.]

XXIV.—*Some Arachnida collected by Mr. G. W. Bury in Yemen.* By R. I. POCKOCK.

MR. G. W. BURY, who made a collecting-expedition, organized by Mr. W. R. Ogilvie-Grant and the Hon. Walter Rothschild, into the Amiri District of the Upper Haushabi, S. Arabia, at an altitude of about 5000 feet, sent home recently a small instalment of Arachnida, which contained so many new and interesting forms that I have considered it worthy of special notice. He is particularly to be congratulated upon the capture of specimens of five new species of Solifugæ, and upon the rediscovery of the genus *Monocentropus*, hitherto known only from Sokotra.

Order SCORPIONES.

Genus NEBO, Sim.

*Nebo hierichonticus* (Sim.).

*Hemiscorpio hierichonticus*, Sim. Ann. Soc. Ent. Fr. 1872, p. 255.

Subsp. *pallidimanus*, nov.

Legs and chelicerae a pale lemon-yellow; chelæ the same colour, except for the fingers and the keels on the hand and other segments, which are deep blackish brown.

*Loc.* El Kubar and Gerba.

The typical form of this species from the Jordan Valley is described by Simon as shining black, with reddish-brown legs. This description nearly fits the S.-Arabian form to which Simon gave the name *flavipes* (Ann. Mus. Genov. xviii. p. 249, 1883). Of this, the British Museum has many examples from Aden and its neighbourhood, collected by Col. Yerbury and the Marquis G. Doria, and from Muscat, collected by Dr. A. J. Jayakar and Mr. F. W. Townsend. Amongst these are co-typical examples of *flavipes*, received from the Genoa Museum. They differ from *pallidimanus* in having the trunk darker, the chelæ very dark brown, scarcely paler than the trunk, and the legs deep ruddy brown.

Genus HETEROMETRUS, Hemp. & Ehrb.

*Heterometrus fuscus*, Hemp. & Ehrb.

*Heterometrus fuscus*, Pocock, Ann. & Mag. Nat. Hist. (7) vi. p. 363 (1900).

*Loc.* Dthala. A single example of the Syrian species was collected.



A form from Beirut described by Simon as *H. maurus*, var. *berytensis* (Ann. Soc. Ent. Fr. 1884, p. 192), which I overlooked in the above-cited paper on *Heterometrus*, and which is also omitted from the 'Tierreich,' apparently differs from *H. fuscus* in having the femur of the chela smooth above.

Genus BUTHUS, Leach.

*Buthus scaber*, Hemp. & Ehrb.

Subsp. *dimidiatus*, Simon.

*Buthus dimidiatus*, Sim. Ann. Mus. Genova, xviii. p. 244 (1883).

Loc. Dthala and El Kubar.

Common in S. Arabia and Perim Island.

The typical form of *scaber* from Arkiko, in Abyssinia, apparently differs from the Arabian form described by Simon in the much paler colour of the dorsal side of the trunk.

Order SOLIFUGÆ.

Genus GALEODES, Oliv.

*Galeodes Granti*, sp. n.

♀.—*Colour*. Head infusate, paler in the middle, darker than the yellowish mandibles, which have two weakly fuscous stripes; palpi and legs pale, only the femora tinted with brown; terga of carapace and abdomen brownish.

Width of *head* in adult approximately equalling length of tibial (penultimate) segment of palp, and the same segment of the fourth leg. Upper and lower jaws of *mandible* with one minor tooth; sometimes a trace of a second minor tooth on the lower jaw.

*Palp* with its femur spined beneath, apparently as in *G. arabs*; the patella armed beneath with seven or eight pairs of very long spines, for the most part alternately longer and shorter, the longer being slightly thicker than the shorter. Tibia armed beneath with eleven pairs of spines: the six corresponding to those found in the male shorter than the others, but mostly exceeding the height of the segment; the rest, corresponding to the long setæ found in the male, much longer but scarcely thinner than the others. Tarsi of second and third *legs* typically armed with 1, 2, 2, 2 spines, the distal pair being on the distal segment; tarsus of fourth with 2, 2, 2, 2 spines typically, sometimes an extra basal spine in front; terminal segment always without spines.

♂.—*Colour*. Head and abdomen rather darker than in the

female; femora and proximal portion of tibia of legs and palpi also rather darker. Patella of *palp* with five pairs of very long spines beneath, and some shorter and thinner intermediate ones; tibia (penultimate segment) with six pairs of spines, shorter than the diameter of the segment, its lower surface entirely free from small, erect, cylindrical or fusiform bristles. No modified bristles on the fifth sternal plate of the abdomen. Bristles on tarsus of fourth *leg* as in *G. arabs*; flagellum scarcely expanded in its terminal portion, which is longer than the basal portion and evenly pointed.

*Measurements in millimetres.*—♀. Total length 44; width of head 13; length of palp 54, its patella 17, tibia 13; length of fourth leg 72, its patella 17, tibia 13.

♂. Total length 44; width of head 12; length of palp 76, its patella 26, tibia 18; length of fourth leg 86, its patella 20, tibia 16.

*Loc.* El Kubar. One male and three females.

For the present it will suffice to point out that the male of this species resembles those of *G. citrinus*, Poc. (Ann. & Mag. Nat. Hist. (6) xvi. p. 81), from Jask, and *G. nigripalpis*, Poc. (Faun. British India, Arachn. p. 144), from Omára, which are nearly related, in the entire absence of short fusiform bristles on the lower side of the penultimate segment of the palp. From both it differs in the colouring of the palp. The first-mentioned character serves to distinguish it from Egyptian forms of *G. arabs*, which, apart from the coloration of the palp, it otherwise approaches. The female differs from that of *G. arabs* and *G. citrinus* in the equality in thickness between the spines and spiniform setæ on the tibia of the palp.

### Genus RHAGODES, Poc.

#### *Rhagodes Rothschildi*, sp. n.

♂.—*Colour.* Mandibles yellowish white proximally, becoming gradually reddish brown distally; head black; terga of last two somites of cephalothorax yellowish white; abdominal terga 1–6 black, 7–9 pallid, 10th or anal black, rather paler close to the anus; sides and ventral surface of abdomen yellowish or greyish brown; palpi and legs uniformly pallid, with the tarsi and distal half of the tibiæ (penultimate segment) of the palp and first leg reddish brown; malleoli and coxæ uniformly pallid. Width of *head* equal to patella  $+\frac{1}{2}$  the tibia of the palp, to patella  $+\frac{1}{3}$  the tibia of the fourth leg, to patella  $+\frac{2}{3}$  the tibia of the third leg. *Palp* nearly twice and a half the width of the head in length.

♀.—Resembling the male in colour and structure, but with relatively shorter appendages. Width of head equal to patella +  $\frac{3}{4}$  tibia of palp and to patella + tibia of fourth leg.

*Measurements in millimetres.*—♂. Total length 25; width of head 9; length of palp 21, of first leg 18, second 17, third 21, fourth 30.

♀.—Total length 37; width of head 10; length of palp 19.5, first leg 15.5, fourth leg 24.

*Loc.* El Kubar.

Resembling the Persian species *R. nigriceps*, Poc., in the coloration of the head and mandibles, but differing in the coloration of the abdomen. In the last particular it comes nearest to the Panjab species *R. semiflava*, Poc., and the Transcasian *R. melanopyga*, Walter, but differs from both in the coloration of the mandibles and carapace.

*Rhagodes Buryi*, sp. n.

♀.—Mandibles coloured as in the last species, but richer yellow; head rich yellow, and ornamented with a median black stripe involving and as wide as the ocular tubercle in front, and gradually widening posteriorly to equal, on the posterior margin of the head, the width of the thoracic tergites; the latter jet-black; tergal plates and dorsal area of lateral membrane of abdomen jet-black; anal segment black; ventral surface of abdomen brown, darker posteriorly; palpi and legs coloured as in *R. Rothschildi*; coxæ also pale as in the latter, but the malleoli marginally infuscate. Relative proportions as in the female of *R. Rothschildi*.

*Measurements in millimetres.*—Total length 30; width of head 7; length of palp 15, of first leg 11, of fourth 19.

*Loc.* Dthala.

Easily distinguishable by its coloration from all hitherto described species.

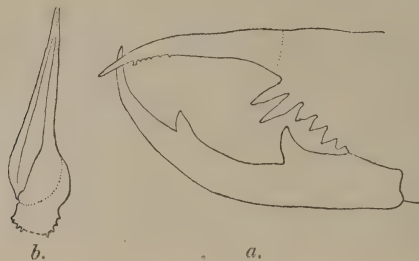
Genus DÆSIA, C. Koch.

*Dæsia laminata*, sp. n.

♂.—*Colour.* Head pale brownish laterally and in front, pallid in the centre; tubercle black; mandibles pallid, unstriped; palpi infuscate, penultimate segment nearly black, tarsus and basal half of femur pale; third and fourth legs infuscate, with distal and proximal ends pale; thoracic segments and abdomen pale.

*Mandible*: upper jaw with false basal articulation, slender, straightish, slightly curved downwards apically, armed on

its distal half externally with about six denticles, of which the first is larger and quadrate, and internally with one denticle; of the six cheek-teeth visible from the outer side the first and second are long and strong, twice as long as the others, which are subconical; lower jaw armed with only



*a.* Left mandible of *Dæsia laminata*; outer side. *b.* Flagellum of the same, its posterior end uppermost, its dorsal edge to the right.

two widely separated largish teeth, one near the base, the other midway between it and the terminal fang. *Flagellum* posteriorly narrow and pointed, gradually tapering; its basal portion furnished dorsally and anteriorly with a laminate expansion, which is fringed, as shown in the annexed figure (*b*).

*Palp* with penultimate segment armed beneath with three external and four internal longish spines.

Abdominal *sterna* normally hairy.

*Measurements in millimetres*.—Total length of body 13, palp 17·5, third leg 11·5, fourth leg 23.

*Loc.* Dthala.

Distinguishable from all known species by the form of the flagellum and the dentition of the jaws.

*Dæsia sabulosa*, sp. n.

♀.—*Colour*. Head, mandibles, and legs almost a uniform yellowish brown, only slightly darker here and there where infuscation commonly occurs; palp with the penultimate segment deeply infuscate, nearly black, contrasting forcibly with the pale colour of the two segments at either end of it.

*Palp* entirely without spines.

*Mandible*: first tooth of upper jaw much smaller than second, which is subequal to the fourth, the third or intermediate tooth nearer to the fourth than to the second; lower jaw with its principal teeth widely separated, one intermediate tooth nearer the second than the first tooth.

*Measurements in millimetres*.—Total length 13; width of



head 3; length of palp 12, its two distal segments 4·8, fourth leg 1·7.

*Loc.* Dthala. One female specimen.

In the coloration of the palpi this species resembles *D. Simoni*, from Obok (see Kraepelin, *Das Tierreich*, Solifugæ, p. 99, fig. 70), but is entirely different in the dentition of the mandibles. The coloration of the palpi serves to distinguish it from *D. tunetana*, subsp. *yemenensis*, Simon, collected at Aden, which it apparently resembles in dentition.

### Order ARANEÆ.

Specimens of only three species of Arachnomorphæ were in the collection, namely, an example of *Ocyale atalanta*, Aud., from Dthala, two examples of *Sparassus Walckenaerii*, Aud., from El Kubar, and one of a species of *Thomisus* I do not recognize, from the Azraki Hills.

### Family Aviculariidae.

#### Genus MONOCENTROPUS, Poc.

#### *Monocentropus longimanus*, sp. n.

♂.—Colour a uniform sooty mouse-brown.

*Carapace* shorter than tibia of palp, about as long as that of the first or fourth leg, slightly longer than the protarsus of the first, very distinctly shorter than that of the fourth; anterior median eyes distinctly larger than anterior laterals, which are themselves larger than the posterior laterals; the latter subequal to the posterior medians.

*Legs* 4, 1, 2, 3; fourth exceeding first by half the length of its tarsus; femur of third thicker than that of the other legs; protarsi with from one to three inferior apical spines; tibia of first and second with a pair of inferior apical spinules, of third and fourth unarmed; scopulæ on protarsi of first and second not reaching the base of the segment; tarsal scopula of fourth basally divided; first leg unmodified, tibial spur low, with pectination of spines.

*Palp* unspined, very long, overlapping by its tarsus the tibia of the first leg; femur as long as that of the second leg; tibia cylindrical, more than twice as long as patella, a little longer than that of the first or fourth leg, but shorter than the protarsus of the latter; tarsus of normal form and length; palpal organ short, about as long as the tarsus; bulb piriform, gradually narrowing where it passes into the style, which shows a slight sigmoid flexure when viewed from the front.

*Measurements in millimetres.*—Total length 24; length of carapace 10, of palp 27, of first leg 41, second 37, third 35, fourth 44.

*Loc.* El Kubar.

Up to the present time the genus *Monocentropus* was represented by a single species, *M. Balfouri*, Poc., known only from Sokotra. The discovery of the genus in Arabia is most interesting. The Arabian species is much smaller than the Sokotran, has uniformly coloured legs and exceptionally long palpi.

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XXV.—*Descriptions of Four new Arachnida of the Orders Pedipalpi, Solifugæ, and Araneæ.* By R. I. POCKOCK.

1. A NEW SPECIES OF PEDIPALP OF THE GENUS  
*HETEROPHRYNUS*.

Genus *HETEROPHRYNUS*, Poc.

Since writing the descriptions of the two new species of *Heterophrynus* which appeared in the 'Annals' for March of last year, a fresh consignment of material from S. America has brought two additional specimens of *H. armiger*, one from Butim in N. Ecuador, the other from the River Durango, N.W. Ecuador. Both of these substantiate the constancy of the characters upon which the species was based, one of the specimens being peculiarly interesting in this connection on account of its immaturity. In addition to these, another well-marked species of the genus was received from Peru. This I propose to diagnose and describe as follows:—

*Heterophrynus elaphus*, sp. n.

*Colour* of carapace and chelæ deep reddish brown; legs paler yellowish red, without annulations.

*Carapace, chelæ, and femora* less coarsely granular, outer and upper side of "hand" smooth, except for a few granules at its proximal end on the outer side; chelæ short, shorter than in any known species except *H. alces*, the femur much shorter than the width of the carapace, the tibia as long as its width, femora of legs about twice the width. All the spines on the *chelæ* long; femur armed with five spines as in *H. cervinus*, *armiger*, and *alces*, and with four below as in *cervinus*, and progressively decreasing in length from the

proximal to the distal end of the segment, but owing to the shortness of the femur the distal spine lies near its distal end, not close to its middle as in *H. cervinus*; the length of the proximal spine, the longest of the series, is equal to half the length of the upperside of the femur; tibia armed with six spines above and five below, as in *H. cervinus*, *H. alces*, and *H. armiger*, and, as in *armiger* and *alces*, the two distal spines on the upperside are shortish, slender, and subequal in thickness and strength (in *cervinus* the ultimate is much stronger than the penultimate); on the underside the second and third spines from the distal end are much the longest of the series and equal; in *H. cervinus* the second spine from the distal end is shorter and thinner than the ultimate and much shorter than the third or antepenultimate. In *alces* and *armiger* the row of spines is practically the same as in *H. elaphus*, except for the presence of an additional spine between those that are the third from the proximal and the second from the distal end; the first long spine on the upperside of the tibia is about its own length from the proximal end; the tibia weakly bowed, about four times as long as high, and rather less than twice the length of the hand. *Hand* spined as in *H. armiger*, the inferior proximal spine smaller than in *H. cervinus*; much smoother than in the latter.

*Measurements in millimetres*.—Total length 32; width of carapace 15, its median length 10·5; length of upperside of femur of chela 11, of tibia 15, femur of second leg 32.

*Loc.* Marcapata Valley, E. Peru.

In the spine-armature of the chelæ this species is intermediate between *H. cervinus* and *H. armiger*. The chelæ, however, are much shorter and less coarsely granular than in either of these species.

The only other species of this genus previously recorded from Peru is *H. gorgo* of Wood (Tr. Am. Phil. Soc. xiii. p. 440, pl. xxiv. fig. 1, 1869). This species is unknown to me, but judging from the figure and description, neither of which is good, it has the chelæ more granular and much longer, the femur exceeding the width of the carapace by one fourth of its length, the tibia exceeding it by one third of its length. The spines, moreover, are much shorter; on the lower side of the femur there are five, of which the third from the proximal end is longer than the second; there are seven spines on the upperside of the tibia, two preceding the first long spine. Width of carapace 16 millim.; length of femur of chela 22, of tibia 25.

All these characteristics point to close relationship between  
*Ann. & Mag. N. Hist. Ser. 7. Vol. xi.* 16

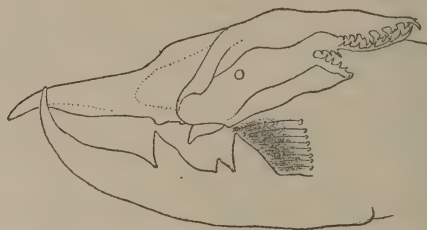
*gorgo* and the common lower Amazonian species, *H. longicornis*, Butler—a fact which suggests that the locality on the label was misread “Peru” for “Para.”

## 2. A NEW EUROPEAN SPECIES OF SOLIFUGÆ.

Genus GLUVIA, C. K.

*Gluvia Chapmani*, sp. n.

♂.—*Colour*. Integument uniformly deep black on the head, mandibles (with exception of the jaws, which are paler), palpi, legs, and dorsal and ventral surfaces of the abdomen—the genital segment, malleoli, and coxæ of the appendages alone being pale.



Right mandible of *Gluvia Chapmani*; inner side.

The whole of the integument covered with a thickish coating of stiff, short, erect hairs of a dirty yellow colour, which relieves the blackness of the integument beneath.

Dentition of *mandible* apparently as in *G. dorsalis*, although the intermediate tooth of the under jaw lies far back behind the anterior large tooth, and not midway between the two large teeth as represented in Kraepelin's drawing; the upper jaw with its dorsal edge not evenly arched from base to point, but abruptly narrowed distad from the flagellum (see figure).

*Flagellum* (see figure) with its dorsal and ventral edges overfolded; the lower edge with a deep and acutely angular excision, the borders of the excision and of the lower edge distad from it pectinate; the distal fourth of the upper edge also strongly pectinate, the pectinations interdigitating with those of the corresponding area of the lower edge; the swivel-joint of the flagellum remote from the rounded extremity of the flagellum, and lying about one fourth of the length of this organ from that end of it. In *G. dorsalis*, according to Kraepelin, only the dorsal border of the flagellum is overfolded, the ventral border is strongly rounded in its proximal half and abruptly narrowed distally, the constriction being rectangular in form;



the margin, moreover, appears to be without the pectinations which are so conspicuous in *G. Chapmani*.

Total length 13 millim.

*Loc.* Spain: Bejar (*T. A. Chapman*). A single male example.

In addition to the structural features pointed out above, this new species differs from the only other species of the genus known up to the present time in being uniformly black in colour. *G. dorsalis*, of which Mr. G. C. Champion has collected female examples for the British Museum, in Spain, has the head and mandibles yellow.

### 3. A NEW GENUS AND SPECIES OF TRAPDOOR SPIDER FROM MADAGASCAR.

#### Genus FORSYTHULA, nov.

Resembling the aberrant genus *Diplothele*, of which I have seen no examples, in the retention of only a single pair of spinners and other characters. The principal differences between the two may be expressed as follows:—

- a.* Thoracic fovea procurved, semilunar (sec. Simon); eyes of the anterior line, at least in the female, forming a quadrangle much wider in front than behind, the distance between the anterior median eyes only half as great as that between the anterior laterals; the anterior laterals and posterior laterals forming the angles of a parallel-sided quadrilateral ..... *Diplothele*.
- b.* Thoracic fovea straight, transverse; eyes of anterior line forming a four-sided figure which is almost a square, being only slightly wider in front than behind; the quadrilateral formed by the anterior and posterior laterals nearly or quite twice as wide behind as in front ..... *Forsythula*.

The discovery of this new genus is a valuable addition to our knowledge of Trapdoor Spiders, both from a systematic and faunistic standpoint. Its nearest ally, *Diplothele*, which hitherto held the unique distinction amongst the Barychelidæ of being the only genus in which the spinning-mammillæ of the anterior pair have atrophied, contains two known species—one described from Orissa in India\*, the other from Ceylon†. The discovery of the nearest ally of this genus in Madagascar is therefore interesting, especially as no kindred form has yet been met with in Africa. Also in view of the probable derivation of most of the fauna of

\* *D. Walshi*, O. P.-Cambridge, P. Z. S. 1890, p. 621, pl. liii. figs. 1-1 h.

† *D. Halyi*, Simon, Hist. Nat. Araign. i. p. 123 (1892).

the Afro-Mascarene continent from northern sources, it is important to bear in mind that, judging from the arrangement of the eyes, *Diplothele* is a more primitive type than *Forsythula*.

Hitherto no genus of Barychelidæ, the almost cosmopolitan family to which the two genera here discussed belong, has been recorded from Madagascar. In fact, the only members of the Mygalomorphæ known from this continental island were *Encyocrates* (a genus of Aviculariidae related to the other genera composing the tropical African, Sokotran, and South Arabian group of the Eumenophorinæ), two genera of Dipluridæ related to S. African forms, one of Ctenizidæ allied to an Australian genus, and some genera of tree trapdoor spiders of the group Migidæ—a group which at the present time is confined to Southern Africa, Madagascar, and Australasia (Tasmania, New Zealand)\*, and must be regarded as affording evidence of a former land-connexion between these countries.

*Forsythula Majori*, sp. n.

♀ ad.—*Colour*. Carapace castaneous; legs and sternum yellowish brown; abdomen ashy black, without pattern.

*Carapace* raised and longitudinally convex in front of the fovea, considerably longer than patella + tibia or than tarsus + protarsus of fourth leg; anterior lateral eyes a little more than their long diameter apart; anterior medians scarcely a diameter apart, and rather more than their diameter from the anterior and posterior laterals; outer edge of the posterior medians about on a level with that of the anterior laterals, the four forming a quadrilateral which is, if anything, slightly wider behind than in front.

*Mandible* with rastellum composed of straight, not curved, spines; armed below with a single inner row of seven or eight teeth and at most a few denticles towards the basal extremity. *Labium* unarmed; maxillæ with about nine to eleven small irregularly arranged cusps. *Sternal sigilla* small, marginal.

*Palpi* and anterior two pairs of *legs* unspined, only one or two stout setæ on the tibia of the palp beneath apically; tarsi and protarsi of the legs subequal, scopulate, the protarsi scantily so, no clavate spines on the tarsi; third leg with some small short spines on the anterior side of the patella and tibia, protarsus unscopulate, with two or three strong and

\* I have recently learnt from Mr. H. R. Hogg that M. Simon has a genus of this group from Chili.

long spines in front and one behind, also longer and shorter spiniform setæ below, sometimes a spine on the front of the tarsus, which is laterally scopulate beneath; fourth leg with protarsus unscopulate, tarsus weakly scopulate; the former armed with a few short spines beneath apically, and with a small comb of spines on its posterior side beneath.

*Measurements in millimetres.*—Total length 10; length of carapace 5, first leg 9, fourth 11.

*Loc.* Madagascar: Ambohimombo, in the Tanala District (*C. I. Forsyth Major*).

So far as what may be regarded as specific features are concerned, this species differs apparently from the two known species of *Diplothele* in the uniform dark colouring of the abdomen, the greater height and convexity of the carapace, the shortness and straightness of the teeth of the rastellum, the larger number and irregular arrangement of the maxillary cusps, and especially in the spine-armature of the third and fourth legs.

#### 4. A NEW TREE TRAPDOOR SPIDER FROM MALTA.

Genus NEMESIA, Aud.

*Nemesia arboricola*, sp. n.

♀.—*Colour.* Carapace uniformly fusco-castaneous, mandibles a little darker; legs uniformly yellowish brown; abdomen uniformly fuscous.

*Carapace* scantily hairy; head high. *Eyes* of anterior line strongly procurved, anterior edge of medians noticeably behind the posterior edge of the laterals; the two laterals on each side separated by a wide space quite equalling the diameter of the anterior medians, which are a little smaller than the anterior laterals; rastellum confined to inner angle of mandible, consisting of about twelve stout spines. *Labium* with two or three cusps; *maxilla* with five in a single row.

*Palp* with tarsal scopula divided, the area apically spined; protarsal scopulæ of first and second legs entire, tarsi apically spined beneath; tibia of first and second legs armed externally with two, beneath with a row of four external spines and one internal apical, the protarsus with two basal, two apical, and one additional external spine beneath and three internal; tibia of palp with three pairs of inferior spines; tarsus with a pair of inferior basal spines.

*Measurements in millimetres.*—Total length 24; length of carapace 7, first leg 15, fourth leg 19.

*Loc.* Malta (*Rev. C. Redman, S.J.*).

Structurally this species of *Nemesia* may be distinguished by the wide space separating the lateral eyes and the presence of a few cusps on the labium. In the strong procurvature of the eyes of the anterior line it resembles the Chinese *N. sinensis*, Poc. (P. Z. S. 1901, p. 212).

The most remarkable feature connected with it, however, is the habit of constructing its dwelling on the trunks of trees instead of burrowing in the ground like the species of the genus hitherto discovered.

The nest much resembles that of *Moggridgea* and other allied genera. It consists of a subcylindrical silk tube, stiffened and concealed with chips of bark and other debris. The largest measures 52 millim. in length and 15 in width. The shape of the tube, however, is not constant. The door is fairly thick and strong, somewhat bevelled towards the margin, and fits into the orifice when closed. One of the nests contained the carcase of a fly and the leg of a bee belonging, as I learn from Col. Bingham, to a male of the genus *Anthophora*.

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XXVI.—*New Species of Oxymycterus, Thrichomys, and Ctenomys from S. America.* By OLDFIELD THOMAS.

*Oxymycterus quæstor*, sp. n.

One of the large reddish forms allied to *O. nasutus*, but larger.

Size fairly large. Median dorsal area yellowish tawny, heavily lined with black, gradually passing on sides and rump into deep reddish tawny, and from that again on the belly into rich ochraceous, the hairs slaty grey at their bases. Crown and middle line of face more heavily black-lined than the back. Cheeks like sides. Ears rather large, their fine hairs uniformly blackish. Front of forearms and upper surface of hands brown; inner surface of arm dull greyish buffy, a marked dark brown patch on each wrist. Legs dark rufous; upper surface of feet brown. Tail finely haired, blackish throughout.

Skull long and narrow, markedly narrower in the brain-case than in the more northern *O. hispidus*. Muzzle long, narrow, parallel-sided; the nasals elongated, broadened, and slightly *retroussés*. Palatal foramina reaching to the level of the first third of  $m^1$ ; posterior nares level with the back of  $m^a$ .



Dimensions of the type (measured in the flesh):—

Head and body 140 millim.; tail 100; hind foot, s. u. 30, c. u. 34; ear 22.

Skull: greatest length 39·5; basilar length 29·7; zygomatic breadth 16·2; nasals, length 16·5, breadth anteriorly 4·4; interorbital breadth 6·1; brain-case breadth 14·5; palatal length 15; palatal foramina 8·4; diastema 9·5; breadth of palatal bridge 4·8; length of upper molar series 5·8.

*Hab.* Serra do Mar, S.E. Brazil. Type from Roça Nova, Parana, altitude 1000 m.; other specimens from Santa Catherina (*Ihering*) and Theresopolis, Rio Janeiro (*Gœldi*).

*Type.* Female. Original number 892. Collected 2nd November, 1901, by Mr. Alphonse Robert.

This species, coloured quite like *O. nasutus*, Waterh., differs from that by its larger size, from *O. hispidus*, Pict., of Bahia, by its smaller size and narrower brain-case, and from *O. rostellatus*, Wagn., from "Brazil," by various cranial details, of which the most tangible is its more elongate palate, that species having its posterior nares level with the back of the second molar.

*Thrichomys Fosteri*, sp. n.

Closely allied to the only known species of the genus, *T. apereoides*, from Lagoa Santa, but darker in colour, with blacker tail, broader palatal foramina, and larger bullæ.

Size as in *T. apereoides*, or slightly larger. General colour of whole upper surface grizzled "broccoli-brown," the hairs light slate basally, darkening distally towards the drab subterminal ring, their extreme tips black. Sides paler and more drab. Under surface sharply defined white, the hairs pale slaty at their bases, except in the inguinal region, where they are wholly white; a band across the chest greyish brown. Head like back above, a small, sharply defined, elongate white patch above eye, another below it, and a third at the outer base of the ear. Lips and chin white. Ears practically naked, their few fluffy hairs greyish. Outer sides of arms and legs like body, or rather more cinereous; inner sides white; centre of metapodials brown, edges, and fingers and toes, white. Tail furred and coloured like the body for its basal inch, then above it is completely black across its whole breadth to the tip; below the proximal half is greyish, gradually darkening to black distally. In *T. apereoides* the black forms a comparatively narrow line above, and the light of the lower surface extends further towards the tip.

Skull very similar to that of *T. apereoides*, but rather

heavier throughout. Nasals and interorbital region broader, and the latter more heavily ridged. Palatal foramina much wider and more open, half as broad again as in the allied species. Bullæ considerably larger and more inflated.

Dimensions of the type (measured in the flesh):—

Head and body 276 millim.; tail 206; hind foot, s. u. 43, c. u. 47·5; ear 24.

Skull: greatest length 57·5; basilar length (c.) 42; greatest breadth 29·5; nasals  $19\cdot3 \times 7$ ; interorbital breadth 13·2; palate length 20·4; palatal foramina  $7\cdot1 \times 5\cdot4$ ; diastema 11; length of bulla 13·3; upper molar series 9.

*Hab.* Sapucay, Paraguay.

*Type.* Old male. Original number 851. Collected 2nd September, 1902, by Mr. W. Foster. Four specimens.

"Trapped among tumbled rocks."

The discovery by Mr. Foster of this Paraguayan species of *Thrichomys* is an exceedingly interesting one, as the genus is excessively rare, and has been recorded hitherto from one locality only, Lagoa Santa, where Lund obtained his "*Echimys opcreoides*," afterwards renamed by him *Nelomys antricola*, under which term it is described in Winge's 'Rodents of Lagoa Santa.'

The British Museum is indebted to the authorities at Copenhagen for one of the specimens described by Dr. Winge, and I have therefore been able to make a direct comparison between the two forms.

#### *Ctenomys Azaræ*, sp. n.

Size medium, about as in *C. tucumanus* and *mendocinus*. General colour uniform brown (between "wood-brown" and fawn-colour) above and pale buffy below, without darker markings on the upper surface or white patches below, the only variation being that the top of the muzzle is slightly darker than the rest.

Skull in general shape most like that of *C. mendocinus*, comparatively narrow and slender, not flattened and squared as in *C. tucumanus*, or thickened throughout as in *C. Perrensi*. Nasals short and narrow. Interorbital region ridged, with rudimentary postorbital processes; parietal ridges more marked than in the allied species. Zygomata sloped backwards gradually to the broadest point, instead of being evenly rounded as in *mendocinus*, or square-shouldered as in *tucumanus*. Palatal notch level with the hinder edge of  $m^2$ , instead of with its centre as is more usual. Bullæ much more swollen than in either of the other species mentioned.

Molars comparatively small, broad, and rounded in section, their enamel running almost completely round them, instead of failing for a larger or smaller gap at their antero-external and postero-internal corners. Last upper molar nearly half the area in cross section of  $m^2$ .

Dimensions of type (measured in spirit):—

Head and body 158 millim.; tail 77; hind foot, s. u. 30, c. u. 35.

Skull: greatest length in middle line 42; basilar length 37·5; zygomatic breadth 26; interorbital breadth 8·5; least breadth above bullæ 17·2; greatest posterior breadth on auditory meatus 26·2; palate length 20; diastema 12·3; bulla, greatest length 15·5; breadth at right angles to the greatest length, excluding meatus, 8·8.

*Hab.* Sapucay, Paraguay.

*Type.* Adult male, in spirit. Collected by Mr. W. Foster. An imperfect skin also received.

This species is most nearly allied to *C. mendocinus*, Phil., of which topotypical specimens, collected by Mr. Bridges, are in the British Museum, but differs by various cranial details, of which the most obvious are the less cut out palate, the larger bullæ, and differently shaped teeth.

*Otenomys Azaræ* is no doubt the Tuco-tuco whose history is given in Azara's famous work on the Mammals of Paraguay; and it is with the greatest pleasure that I take this opportunity for naming a species in honour of that naturalist, for whom I have always felt the most sincere admiration. No one who has read his book, as I have again and again, can fail to be attracted by his character, his *naïveté*, and his genuine love of his subject, or to admire the excellence and accuracy of his descriptions, which, while innocent of technicalities, were better than any others of his date, and indeed than many of those produced by technical zoologists for half a century later.

XXVII.—*Description of a new Coleopterous Insect belonging to the Curculionidæ.* By CHARLES O. WATERHOUSE, F.E.S.

A SHORT time ago I received from Mr. G. H. Carpenter, of the Science and Art Museum, Dublin, some weevils which were injurious to ferns in greenhouses. Whence these insects came is not known, but they belong to the genus *Syagrius* of

Pascoe, and are therefore almost certainly Australian. The species, which appears to be undescribed, I propose to call

*Syagrius intrudens*, sp. n.

Elongatus, crassus, subparallelus, piceo-niger, parum nitidus, rugosus; antennis tarsisque piceis.

Long. 7-10 mm.

Rostrum gently arcuate, thick, with a fine median smooth line and with a groove on each side above the antennal groove; the apex shining and finely punctured. Forehead rugosely punctured, with a well-marked impression in the middle. Thorax with its broadest part in front of the middle, a trifle narrower at the anterior angles than at the posterior; the sides arcuate; the base exactly fitting the base of the elytra, but a trifle narrower. The surface very uneven, consisting of closely placed irregular obtuse tubercles, some of which are shining. The interspaces with very short brownish pubescence. Elytra very convex, humped up at the suture, with a slight constriction at the base, gradually widening from this to the apical declivity, where they are as wide as the widest part of the thorax. Apical declivity almost vertical. The region of the scutellum and some irregular, rather oblique, vermiculate impressions dull black. The rest of the surface covered with very irregular more or less confluent tubercles, which are themselves ornamented with very small shining tubercles. Near the suture, just at the apical declivity, there are two tubercles which are rather more prominent than the others; these and some of the others have more or less brownish hair on them. There are also some of these short brown hairs just within the humeral angle. At the sides there are two or three rows of elongate deep foveæ.

The punctuation of the basal portion of the rostrum varies very much. Some specimens have it closely and rugosely punctured; in others the punctures are separated and the surface is shining. This difference is no doubt sexual.

This species resembles *S. fulvitarsis*, Pascoe (Ann. & Mag. Nat. Hist. xvi. 1875, p. 56), but the rostrum is less strongly curved and the tubercles on the dorsal surface of the thorax and elytra are much more numerous. In *S. fulvitarsis* the dull black surface is greater than that occupied by the tubercles; in *S. intrudens* the reverse is the case.

The specimens vary very much in size. I am told by Mr. A. M. Lea that *Syagrius* is injurious to ferns, especially to *Adiantum*, in greenhouses in Sydney.



XXVIII.—*On a new Silver-Pheasant from Burma.*

By EUGENE W. OATES.

*Gennæus affinis*, sp. n.

♂. Similar to *Gennæus Williamsi*, Oates, but with the sides of the lower neck and of the breast streaked with white.

The female is unknown.

This species may be separated from all the other members of the genus by its brown legs, by the feathers of the lower back and rump being both vermiculated and fringed with white, the fringe and the first vermiculation being separated by a distinct black band about as wide as the fringe, and by the white streaks on the lower plumage.

The type specimen, the only one at present known, was shot by Captain W. G. Nisbett of the Military Police of Upper Burma, near the Namli River, east of Myitkyina on the Upper Irrawaddy River, at 2000 feet elevation.

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XXIX.—*Notes on the Forficularia.*—VII. *Some hitherto unpublished Descriptions of new Species, by the late M. Auguste de Bormans.* By MALCOLM BURR, B.A., F.L.S., F.E.S.

WHEN the British Museum acquired the de Bormans collection of *Forficularia*, it was found that a number of individuals were marked with manuscript names by de Bormans himself. When the paralysis struck down my unfortunate friend, I was lucky enough to acquire, together with many duplicates from his collection, all his notes and manuscripts, much of his correspondence, and last, but not least, his album of drawings, containing an illustration of almost every species that had passed through his hands. Among the notes are descriptions of a number of species corresponding with the MS. names referred to, the types of which are partly in the British Museum, partly distributed among other European collections, the majority being in the Brunner collection, now in the Hofmuseum, Vienna. As all these specimens were determined by him, and labelled by him under these manuscript names, I have retained them in every case.

My desire to publish these descriptions, in order to avoid confusion in synonymy, in the event of other authors describing the same forms under different names, has been increased by Mr. Kirby telling me of the forthcoming appearance of a general catalogue of the Orthoptera, including the earwigs.

These descriptions, which are copied direct from the manuscript of my late friend, I have not altered. I have confined myself to writing in full the words which were abbreviated; the fact that many are merely notes, not actually in the final form for publication, explains the condensation of the language into almost telegraphic brevity in some instances; apparent faults in grammar can be explained as ellipses.

Some descriptions call forth further remarks upon the species, which will be published in a later paper.

*Pygidicrana papua*, de Bormans, sp. n.

♂. Long. corp. 29 mm., long. forc. 7 mm.

(1<sup>ère</sup> groupe.) Tête plate, plus large que le pronotum, testacé ocreux, sauf la bouche, le front jusqu'aux yeux et une fine bordure latérale noire. Antennes de 32 articles, couleur de la tête, sauf les 2 premiers bruns. Pronotum couleur de la tête, une fine bordure antérieure, une petite stria contre le milieu du bord postérieur et 2 points enfoncés bruns. Élytres testacées, bord externe et sutural, une bande longitudinale médiane brune. Écaille alaire, moitié externe brune, moitié interne testacée. Pattes testacées. Abdomen brun foncé, avec une villosité jaune. Branches de la pince brun foncé, écartées à la base, triquétes, faiblement arquées, divergentes, un peu dirigées vers le haut, pointes courbées en dedans, la gauche un peu plus longues et plus droite; ♀ contigues, semblables.

Nouvelle Guinée. Coll. Brunner, no. 21,293 ♂, 21,668 ♀. Voisin de *P. Daemeli*.

*Pygidicrana biafra*, de Bormans, sp. n.

♂. Long. corp. 6 mm., forc. 7 mm.

Brun de poix, couvert d'une villosité jaune; tête de même largeur que le pronotum; bouche, palpes, antennes (37 articles) bords latéraux (en triangle) du pronotum, écusson, ailes, pattes jaun de cuir pâle. Branches de la pince triquétes, contigues, creuses en dessus et larges à la base, faiblement arquées en dedans, assez courbées vers le haut à partir du milieu (la droite un peu plus courbée et plus droite), fortement recourbées en dedans avant les pointes. Bord interne entièrement et très finement denticulé.

Kamerun. Coll. Brunner, no. 21,376.

Voisin de *Daemeli*.

*Pygidicrana quadriguttata*, de Bormans, sp. n.

♂. Long. corp. 20.5 mm., forc. 3.5 mm.

Tête plate, terreuse; bouche, palpes et antennes de 26 articles? jaune d'ocre, sutures distinctes. Pronotum aussi long et large que la tête, bords arrondis; les  $\frac{3}{4}$  antérieurs terreux, avec un sillon longitudinal médian; le  $\frac{1}{4}$  postérieur bien séparé de la première portion par une ligne courbée creuse, concave en arrière, et les côtés jaune d'ocre clair. Écusson assez petit, jaunâtre. Élytres ayant une fois et quart la longueur du pronotum, qu'elles débordent peu à la base; épaules arrondies, côtés sinueux, concaves au milieu, puis dilatés et convexes; bord postérieur légèrement concave. Elles sont d'un noir mat avec quatre taches demirondes, d'un beau jaune orangé, une sur chaque épaule, une sur chaque apex. Écaille alaire peu saillante, jaune blanchâtre. Pattes jaune d'ocre claire. Abdomen brun, couvert d'une pubescence blanchâtre, en trapèze très allongé jusqu'au dernier segment dorsal; celui-ci est subcarré, son bord postérieur assez échancré au milieu et de chaque côté au dessus de la racine de la pince, un très faible sillon longitudinal médian n'atteignant pas le bord postérieur. Branches de la pince d'un noir luisant, assez robustes, triquéto-arrondies, presque contigues, un peu sinueuses, arquées dehors et vers le haut; pointes croisées, la droite plus courbée que la gauche.

S. Celebes, Bua Kraeng, 5000' (*Fruhstorfer*).

"Coll. mea. Groupe de *Daemeli*, pince ♂ et ♀ comme chez les *Psalis*."

*Pygidicrana celebensis*, de Bormans, sp. n.

♂. Long. corp. 20.5 mm., forc. 8 mm.

Tête, antennes brun marron, palpes couleur cuir. Pronotum couleur cuir, côtés testacés, tiers postérieur brun. Écusson, élytres couleur cuir. Écaille alaire jaune clair uniforme. Pattes testacées, cuisses avec 2, tibias avec une raie longitudinale brune, peu marquée. Abdomen brun, marron, pubescence courte jaunâtre de longs poils clairs en bouquets sur les côtés; dernier segment dorsal rectangulaire, uni, inerme, couleur de cuir, rougeâtre. Branches de la pince dilatées, creuses en dessus et subcontigues à la base divergentes et arquées en ellipse allongée jusque vers les  $\frac{3}{4}$  où elles sont renflées, de là à l'apex très peu écartées, pointes contigues (forme *marmoricrura*, ♂).

S. Celebes, Bua Kraeng, 5000'. Coll. Brunner, no. 20,869.

*Carcinophora boliviana*, de Bormans, sp. n.

♂. Long. corp. 11.5 mm., forc. 4 mm.

Tête noire, antennes (il reste 13 articles) brunes, sauf les

trois premiers, couleur cuir; pronotum, élytres ( $\frac{1}{2}$  longueur du pronotum), abdomen bruns; plis des 2<sup>me</sup> et 3<sup>me</sup> segments faibles, mais distincts. Pygidium très court, en lame échan-crée. Pattes de la couleur de cuir. Branches de la pince d'un brun rouge, triquéto-arrondies, très écartées à la base, d'un brun rougeâtre, un peu arquée et sinueuses, convergentes, points contigues, arête interne dilatée en dedans aux  $\frac{3}{4}$  longueur, en dent très obtuse.

Songo (Bolivia). Coll. Brunner, no. 21,037.

*Anisolabis ? incerta*, de Bormans, sp. n.

♂ seul. Reste 11 articles aux antennes; couleur du corps (voir dessin très exacte \*) de forme singulière. Les trois parties du thorax également de forme particulière; corps entièrement d'un brun de poix (sauf les pattes testacées brunâtre, celles-ci plus grêles que de coutume). Corps très fortement pointillé. Tarses ordinaires, 1<sup>er</sup> article double du 3<sup>me</sup>; 2<sup>de</sup> très petit, cylindrique, sans touffe de poils longs, le tarse tout entier avec une villosité courte. ♀ ignota.

*Dimensions.*

Long. corp. ....	16.25 mm.
„ pron. ....	2.25 „
„ meson. ....	0.90 „
„ (milieu) metan. ....	0.35 „
„ ult. seg. abd. ....	1.75 „
„ forcipis. ....	5 „
Lat. pron. ant. ....	2.50 „
„ „ post. ....	3 „
„ meson. post. ....	3.25 „
„ metan. post. ....	3.50 „
„ abd. med. ....	4.50 „
„ ult. segm. ant. ....	4 „
„ „ post. ....	3.75 „

*Habitat.* Loja (Équateur) (*Simon*). 1 ♂, coll. Bolivar.

*Spongiphora Lewisi*, de Bormans, sp. n.

Long. corp. 12 mm., forc. 8.5 mm.

Brun-noir, mat, antennes, tarses, abdomen, pince un peu plus clairs, glabre. Il reste 14 articles antennaires. Pronotum long et large comme la tête, subcarré, bords postérieur arrondis. Abdomen très finement pointillé, ses côtés presque parallèles; dernier segment trapézoïdal, plus étroit à l'apex, un peu plus large que long, brun rougeâtre, le bord postérieur

\* [This, of course, refers to the "album." The species is represented in the British Museum and will be dealt with again later.—M. B.]



bien rebordé. Bords postérieurs de chaque segment faiblement granulé. Pygidium bien saillant, convexe, trapézoïdal avec les angles postérieurs aiguës et bien prononcés, jusqu'au tiers, puis creusé en dehors en finissant en pointe conique allongée. Branches de la pince bien écartées à la base, assez grêles, d'épaisseur à peu près constante, subdroites et convergentes jusqu'aux  $\frac{3}{4}$  environ, où elles se courbent un peu et se croisent. Le bord interne offre quelques denticulations espacées et très faibles jusqu'à une petite dent située au delà du milieu.

Hako (Japon), sur les arbres, 12.v.81 (*G. Lewis*).

1 ♂.

[This male, the only known specimen, is now in the collection of the British Museum.—M. B.]

*Labia flavicollis*, de Bormans, sp. n.

♂. Vix convexa, glabra, capite lævi, elytris alisque punctatis, nigro-fuscis; antennis, abdomine lævi, forcipeque rufo-castaneis, femorum dimidio basali fusco, dimidio apicali, tibiis tarsisque necnon pronoto flavo-testaceis: forcipis crura robusta, inermia, basi remota, intus dilatata necnon lateraliter depressa, subtriquetra, circularia, valde ante apicem decussata, apice summo tantum mucronata. ♀ ignota.

Long. corporis .....	4.25 mm.
„ pronoti .....	0.60 „
„ elytrorum .....	0.75 „
„ alarum .....	0.60 „
„ dors. ult. seg. ....	0.40 „
„ forcipis .....	0.50 „
Latit. pronoti .....	0.50 „
„ elytrorum .....	1.00 „
„ abdom. max. ....	1.20 „
„ ult. seg. ....	0.75 „

♂. Tout le corps de l'insecte est glabre, sauf quelque longs poils isolés çà et là, peu épais, à peine convexe.

Tête d'un noir brun, sauf la bouche plus pâle, à peu près aussi large que longue; sans suture ni marque distincte; yeux non saillants; antennes (il reste dix articles) de forme typique, d'un marron grisâtre, uniforme.

Pronotum d'un jaune testacé, subcarré, de la longueur et largeur que la tête; son bord antérieur légèrement oblique de chaque côté, en prolongement du cou bien visible; ses angles arrondis, et hérissés de quelques longs poils noirs horizontaux; ses côtés droits, parallèles, à peine ourlés, mais bien relevés en gouttière, surtout postérieurement. Les trois

quarts antérieurs de sa surface sont bombés au milieu, le reste légèrement déprimé.

Élytres d'un brun presque noir, ponctuées, plus longues que le pronotum de la moitié de celui-ci, qu'elles débordent de chaque côté de sa demi-largeur environ ; angles huméraux très arrondis ; côtés droits, parallèles ; bord postérieur coupé obliquement de dehors en dedans.

Partie saillante des ailes de la couleur et de la consistance des élytres ; de la longueur du pronotum.

Pattes de forme typique, moitié basale des cuisses brune, le reste, les tibias et les tarses d'un jaune testacé.

Abdomen d'un marron clair rougeâtre, un peu dilaté au milieu, plis des 2<sup>de</sup> et 3<sup>me</sup> segments visibles mais seulement à la loupe, et placés tout près du bord latéral. Dernier segment subrectangulaire, deux fois aussi large que long, son bord postérieur un peu sinueux ; au dessus de chaque racine des pinces un petit tubercule ; au milieu, près du bord postérieur, une très courte impression longitudinale.

Pygidium visible seulement avec un très fort grossissement, en forme de bourrelet transversal, fendu longitudinalement au milieu.

Penultième segment ventral assez grand, son bord postérieur arrondi et prolongé au milieu en une lame minuscule, plane et étroite.

Branches de la pince robustes, inermes, de la couleur de l'abdomen ; chacune d'elles a la forme d'un quart de cercle ; elles sont peu écartées, triquètres, fortement dilatées en dedans et déprimées sur les côtés externes à la base ; puis elles s'amincissent subitement, deviennent cylindriques et s'entre-croisent bien avant l'apex, tout en conservant une épaisseur uniforme jusqu'aux pointes brusquement aiguës.

*Habitat.* Iles Samoa. 1 ♂ ; coll. Dohrn.

“*Note.*—Cette espèce a la plus grande analogie avec la *Labia curvicauda*, Motsch., elle n'en diffère que par la couleur du pronotum jaune, et non brune, les ailes très longues ; le pronotum, les élytres et les ailes glabres, et peut-être la couleur des derniers articles antennaires ; malheureusement, l'exemplaire unique que nous avons sous les yeux n'a conservé que 10 articles aux antennes, et comme la *L. curvicauda* a précisément le 10<sup>me</sup> ou 11<sup>me</sup> article blanchâtre, je ne puis établir la comparaison.”

*Labia pulchripes*, de Bormans, sp. n.

Glabra, nitida, fusco-castanea, capite læte coccino-aurantiaco, ore oculisque nigris ; antennis 15-articulatis, castaneis (art. 2 et 3

rufis exceptis); pronoti margine laterali antice angustato, postice latius, alis vix prominulis, femorum tibiærumque dimidio apicali, tarsis testaceis: abdomen maris parum, feminae valde medio dilatatum: pygidium ♂ breve, transversum, trapezoidale, convexum, declive, apice vix emarginatum, angulis posticis prominulis; ♀ haud distinctum: forcipis crura castanea, inermia, mucronibus parum acutis; ♂ sat gracilia, cylindrica, elongata, basi remota, usque ad medium fere recta, necnon parallela, deinde arcuata, apice decussata; ♀ robustiora, subrecta, basi contigua, deinde vix divergentia, paullo ante apicem decussata.

	♂.	♀.
Long. corporis .....	6.50 mm.	6.75 mm.
„ pronoti .....	1 „	1 „
„ elytrorum .....	1 „	1.25 „
„ alarum .....	0.15 „	0.15 „
„ ult. segm. abdom. ....	0.25 „	0.50 „
„ forcipis .....	2.25 „	2 „
Latit. pronoti .....	1.25 „	1.25 „
„ elytrorum .....	1.50 „	1.50 „
„ abdom. max. ....	2 „	2.75 „
„ ult. seg. dors. antice ...	1.50 „	1.55 „
„ „ „ postice ...	1.25 „	1.50 „

Tête plus longue que large, peu bombée, d'un beau rouge carmine orangé, la bouche et les yeux noirs. Sutures fines mais distinctes, yeux petits, peu proéminents. Antennes de 15 articles, bruns, sauf les articles 2 et 3 rougeâtres, et les 5 derniers plus pâles. Le 1<sup>er</sup> article assez long, tronconique, et très épais à l'apex, le 2<sup>de</sup> très petit; le 3<sup>me</sup> de la longueur du 1<sup>er</sup>, mais beaucoup plus grêle, conique; le 4<sup>me</sup> un peu plus grand que le second, court, épais, tronconique; les autres croissent très régulièrement en longueur et conservent une forme conique bien marquée jusqu'aux 4 derniers plus minces et presque cylindriques.

Pronotum subtrapézoïdal un peu plus court que la tête, son bord antérieur droit, à peine plus étroit que celle-ci, ses angles antérieurs aiguës; côtés droits, légèrement divergents; bord postérieur droit, ses angles bien arrondis. Sa surface est convexe, et d'un brun marron foncé sur une espace en forme de V, dont la pointe touche le milieu du bord postérieur, et dont chaque branche aboutit à un des angles antérieurs du pronotum; le reste est plat et forme une bordure testacée plus large en arrière qu'en avant.

Élytres brun marron foncé, de la longueur du pronotum, qu'elles débordent à peine de chaque côté; angles huméraux arrondis; côtés droits, parallèles, bord postérieur droit.

Ailes à peine saillantes au delà des élytres, sous forme d'une petite écaille transversale testacée.

Pattes de forme typique; cuisses robustes, leur moitié basale brune, le reste, les tibias et les tarses testacés; les tibias parfois rembrunis à leur base.

Abdomen d'un brun marron luisant; plis des 2<sup>de</sup> et 3<sup>me</sup> segments bien distincts: ♂ peu convexe et médiocrement dilaté au milieu; ♀ très bombée et même bossue et fortement élargie au milieu. Dernier segment: ♂ extrêmement court, plat, subtrapézoïdal, uni, avec une élévation à peine visible, au dessus de chaque racine de la pince; ses bords droits, l'antérieur un peu plus grand que le postérieur; ♀ deux fois aussi long que celui du ♂, de même forme mais assez convexe, déclive, son bord postérieur un peu sinueux; il offre au milieu un gros point bien enfoncé; ses bords latéraux sont hérissés de quelques poils épais et longs.

Pygidium: ♂ noir, saillant de la longueur du dernier segment, en forme de trapèze à côtés arqués, convexe, déclive; le bord postérieur un peu échancré, les angles postérieurs accusés. ♀ non visible.

Penultième segment ventral ♂ et ♀ très court, arrondi en arc d'ellipse transversal, cachant entièrement le dernier segment.

Dessous du corps semblable au dessus pour la couleur et la consistance.

Branches de la pince d'un brun marron, un peu plus clair que l'abdomen, rondes, inermes, leurs points peu aiguës. ♂ assez grêles, allongées, d'une épaisseur uniforme, écartées et à peine dilatées à la base; elles sont presque droites et parallèles jusqu'un peu avant le milieu, puis courbées régulièrement en dedans jusqu'aux pointes entre-croisées: ♀, presque droites, plus robustes que celles du ♂, surtout à la base, où elles sont contigues; puis elles s'écartent à peine et diminuent graduellement de grosseur jusqu'aux pointes, qui sont courbées et se croisent; le bord interne offre une crénelure très fine, visible seulement à la loupe.

1 ♂, 1 ♀, 1 nymphe ♂; coll. Dohrn. Australie boréale.

" Cette espèce offre la même distribution de couleur et la forme générale de la *Forficula oceanica*, Blanch., = *F. Erichsoni*, Dohrn, = *F. ruficeps*, Erichson. Elle en diffère par les caractères génériques; la présence d'ailes, la taille plus petite, le pygidium du ♂ différent. Elle a beaucoup d'analogie avec *L. amœna*, Stål; elle en diffère par le nombre et la coloration des articles antennaires, la pince inermes chez les deux sexes."

*Labia Rogenhoferi*, de Bormans, sp. n.

♂. Rufo-testacea, tota fulvo-pubescent, elytris alisque fusco-nigris; pygidium productum, triangulo-cordiforme; forcipis brachia



robusta, basi remota interque (?) breviter dilatata, inermia, subrecta, paullo ante apicem leviter incurva, triquetra, carinis acutis. (♀ ignota.)

Long corpor. ....	5.50 mm.
„ pronoti .....	1 „
„ elytr. ....	1.20 „
„ alarum .....	0.75 „
„ ult. segm. ....	0.50 „
„ forcipis .....	1.75 „
Latit. pronoti .....	1 „
„ elytr. ....	1.40 „
„ ult. segm. ....	1.25 „
„ abdom. basi .....	1 „

Tête presque aussi longue que large, peu bombée, d'un testacé fauve, les organes buccaux plus clairs; sutures indistinctes; yeux noirs, petits; antennes (il reste 14 art.) de forme typique et de la couleur de la tête.

Pronotum de la couleur et de la largeur de la tête, dont il est séparé par un petit cou bien visible; trapézoïdal, aussi long que large; bord antérieur droit, un peu plus étroit que la postérieur, ses angles aiguës munis chacun d'un petit bouquet de 3 ou 4 poils longs et raides; côtés droits, bord postérieur presque droit, ses angles arrondis. La surface de la moitié antérieure est convexe au milieu, séparée des bords postérieurs et latéraux largement aplatis, par une dépression, les côtés à peine relevés et rebordés.

Élytres un peu plus longues que le pronotum, qu'elles débordent de chaque côté d'un quart de sa largeur environ, d'un brun noir, ainsi que les ailes; angles huméraux arrondis, côtés parallèles, bord postérieur coupé droit.

Partie saillante des ailes d'une longueur égale au quart du pronotum.

Pattes de forme typique, d'une testacé brunâtre.

Abdomen d'un testacé fauve, peu bombé, se dilatant régulièrement du premier au neuvième segment; plis ordinaires des 2<sup>de</sup> et 3<sup>me</sup> segments presque indistinctes; dernier segment rectangulaire, plus de deux fois aussi large que long, ses bords droits; il est un peu déprimé à partir du bord postérieur entre deux petits tubercules placés au dessus les racines de la pince.

Penultième segment ventral assez grand, subrectangulaire, avec les angles postérieurs arrondis, couvrant entièrement le dernier.

Pygidium bien saillant, en forme de triangle, ou plutôt de cœur terminé par une petite pointe émoussée.

Dessous du corps un peu plus clair que le dessus.

Branches de la pince de la couleur de l'abdomen, robustes, lisses, triquètres, avec les trois arêtes très accusées et tranchantes ; elles sont écartées dans tout leur longueur, l'arête interne dilatée à l'extrême base, en une petite lame triangulaire. Elles sont presque droites et se rétrécissent graduellement et modérément jusqu'aux pointes peu aiguës, légèrement recourbées dedans et distantes l'une de l'autre.

Toute la surface du corps est couverte d'une pubescence fauve très serrée, ressortant surtout sur la couleur foncée des élytres et des ailes, qu'elles font paraître comme veloutées.

*Habitat.* Equateur. 1 ♂ (Musée de Vienne).

### *Observation.*

Cette petite espèce ressemble beaucoup au premier aspect à la *Labia minor*, L. Voici les caractères qui l'en distinguent nettement :—

1°. Par les antennes de 14 articles unicolores (chez *minor* 10-12 art. pâles à la base et à l'apex).

2°. Par la forme du pygidium du ♂.

3°. Par le penultième segment ventral coupé droit postérieurement et nullement prolongé en pointe.

4°. Par la pince à trois arêtes, très marquées, et absolument lisse (chez *L. minor* arrondies et denticulées au bord interne).

[In another note, speaking of *Labia equatoria*, Burr, he writes, "Voisine de *L. Rogenhoferi* (inédit), mais pygidium, pince, etc. différents."]

### *Labia tristis*, de Bormans, sp. n.

Long. corp. 9 mm., forc. 4.5 mm., ♂.

Marron rougeâtre, peu luisant, glabre. Tête bombée sans sutures visibles ; antennes de 13 articles, bruns clair, sauf les 2 premiers testacés. Pronotum de la largeur de la tête et un peu plus foncé, subtrapézoïdale (plus large postérieurement), plus long que large, moitié antérieure bombée en forme de cœur, bords relevés très étroits, plus clairs. Élytres très peu plus longues que le pronotum, qu'elles débordent peu, coupées droites à l'apex, d'un noir mat. Ailes nulles. Pattes brun clair. Abdomen à côtés subparallèles, dernier segment dorsal subrectangulaire, plus large que long, avec une légère courte subovale dépression au milieu du bord postérieur. Pygidium très peu saillant, large subrectangulaire, l'apex un peu creusé. Branches de la pince allongées, subdroites, écartées à la base, de celle-ci jusqu'un peu avant le milieu triquètres, l'arête interne dilatée en lame arquée, mince,

terminée par une dent, puis elles sont cylindriques, avec deux dents microscopiques à l'arête interne, jusqu'aux pointes contigues.

Nouvelle Calédonie.

Voisin de *L. dolicha* et *L. mexicana*, etc.; en diffère par la coloration de la forme de la pince.

[To be continued.]

## BIBLIOGRAPHICAL NOTICES.

*Paleontologia Indica*. Series XV. *Himalayan Fossils*. Vol. II.  
Part 1. *The Cephalopoda of the Lower Trias*. By CARL DIENER,  
Ph.D., University of Vienna. Pages 181; plates i.-xxiii. Folio.  
Calcutta: Geol. Survey Office. London: Kegan Paul & Co.

IN 1879 C. L. Griesbach (now Director of the Geological Survey of India) discovered, near the Niti Pass, the *Otoceras* beds, which contain the oldest Cephalopod-fauna of the Buntsandstein. They lie just above the Permian *Productus* shales, and below shales and limestones, which are overlain by true Muschelkalk. The same observer discovered another Cephalopod-horizon higher up in the series, and identical with Diener's "*subrobustus* beds" in the upper part of the Lower Triassic series. In 1892 the surveyors discovered some very characteristic Ammonites in a bed of the same age as the last-mentioned in the Shalshal river-cliff opposite the Rimkin Palar camping-ground, a little below the confluence of the Barahoti and Chorhoti Rivers. Of this section a woodcut-figure is given at page 3, showing:—

8. *Dacnella* beds.
7. Crinoidal limestones with fossils of the *Æonoides* horizon (*Johannites* cf. *cymbiformis*).
- h. *Halobia* bed of the *Æonoides* horizon.
6. } Muschelkalk { Upper division.
5. } { Lower division.
- g. Main layer of *Ptychites rugifer*.
- f. Main layer of *Ceratites Thuilleri*.
4. Horizon of *Sibirites Prahlada*.
3. *Subrobustus* beds.
2. *Otoceras* beds { c. Shales alternating with limestones.  
d. Shales.  
c. Limestones with *Ophiceras*, sp.  
b. Shales with *Medlicottia Dalailamæ*.  
a. Main layer of *Otoceras Woodwardi*.
1. *Productus* shales (Permian).

The characteristic Cephalopods of the several strata of the series under notice in this and other sections are carefully compared.

	Eastern Alps.	HIMALAYAS.		Salt-Range.
		Main region.	Hallstatt development of Chitichun.	
Upper Muschelkalk.	Upper Muschelkalk. Horizon of <i>Ceratites trinodosus</i> .	Muschelkalk with <i>Ptychites rugifer</i> , <i>Ceratites Thuillieri</i> , <i>Beyrichites Khanikofi</i> , <i>Buddhaites rama</i> , etc.		Dolomite Group (?) ( <i>pro parte</i> ). Bivalve beds.
Lower Muschelkalk.	Lower Muschelkalk. Horizon of <i>Ceratites binodosus</i> .	Brachiopod beds with <i>Sibirites Prahlada</i> , <i>Rhynchonella Griesbachi</i> , etc.	Red limestones of Chitichun (Lochambelkichak) with <i>Procladiscites yasoda</i> , <i>Monophyllites Confucii</i> , <i>Sturia mongolica</i> , etc.	Upper Ceratite Limestone (?).
Buntsandstein.	Campil beds. Cephalopod-bearing horizon with <i>Meekoceras caprilente</i> , <i>Tirolites Cassianus</i> , <i>Dinarites dalmatinus</i> , etc.	<i>Subrobustus</i> beds with <i>Ceratites subrobustus</i> , <i>Flemingites rohilla</i> , etc.	(?)	Ceratite Sandstone.
	Werfen beds.  Seiss beds.	<i>Otoceras</i> beds.  Unfossiliferous shales and limestones.  Main layer of <i>Otoceras Woodwardi</i> .		Ceratite Marls. Lower Ceratite Limestone.  Unfossiliferous shale and sandstones.
Permian.	<i>Bellerophon</i> beds of Southern Tirol and Venetia.	<i>Productus</i> shales with <i>Productus cancriniformis</i> , <i>P. Abichi</i> , <i>Spirifer musakhelensis</i> , etc.	Limestone-crag of Chitichun No. 1 with <i>Popanoceras trimurti</i> , etc.	Upper <i>Productus</i> Limestone.  Chidru beds.  Jabi beds.



Julfa, Armenia.	North-eastern Siberia (Olenek River).	Eastern Siberia (Ussuri district).	Spitzbergen.	Idaho (U. S., America).
			<i>Daonella</i> limestones.	
Beds with <i>Rhizocorallium</i> (?).	Fauna of Mengilacch with <i>Beyrichites</i> <i>affinis</i> , <i>Hungarites</i> <i>triformis</i> , etc.	Sandstones with <i>Monophyllites sich-</i> <i>oticus</i> , etc. (Russkij Island).	<i>Posidonomya</i> limestones.	
Shaly limestone beds with <i>Pseudomonotis</i> cf. <i>Clarai</i> and (?) <i>Tirolites</i> .	Olenek beds with <i>Ceratites subrobus-</i> <i>tus</i> , <i>Dinarites</i> <i>glacialis</i> , etc.			<i>Meekoceras</i> beds of Idaho with <i>Meekoceras</i> <i>gracilitatis</i> , <i>M. aplanatum</i> , etc.
		<i>Proptychites</i> beds with <i>Proptychites</i> <i>hiemalis</i> , <i>Kingites</i> <i>varaha</i> , etc.		
<i>Otoceras</i> beds of Julfa with <i>Gastri-</i> <i>oceras Abichianum</i> , <i>Otoceras tropitum</i> , etc.				

pages 3-10; and then the main object of this memoir, namely the detailed description of the Lower Triassic Cephalopoda of the Himalayas, is carried out at pages 11-164, with good illustrations on plates i. to xxiii.

The following are the genera of Cephalopoda here figured and described:—

<i>Ammonia trachyostraca.</i>	Species.			Species.
Ceratites .....	2	Ophiceras .....		10
Danubites .....	13	Sub- { Meekoceras .....		5
<i>Ammonia leiostroma.</i>		genera { Koninckites .....		2
Prosphingites .....	2	{ Kingites .....		1
Medlicottia .....	1	{ Aspidites .....		1
Hedenströmia .....	2	Lecanites .....		2
Nannites .....	2	Prionolobus .....		1
Proptychnites .....	4	Hugurites .....		1
Vishnuites .....	1	Otoceras .....		6
Flemingites .....	4			

The faunistic and geological results are worked out at pages 165-179; and the accompanying tabular statement (pp. 242-243) shows the correlation of the Upper Permian and Lower Trias formations of the Himalayas with those of other countries.

*The Palæontology of the Niagaran Limestone in the Chicago Area.*

*The Crinoidea.* By STUART WELLER. *Bull. Nat. Hist. Survey Chicago*, iv. part 1, 153 pp., xv. pls., and text-figures. 27th June, 1900.

THIS is the first contribution to the palæontology of the area covered by the Natural History Survey of Chicago, and including nearly 1800 square miles. It should be particularly useful to the students of the Chicago University in its general account of the Crinoidea, as illustrated by specimens which, though not particularly well-preserved, are the nearest to their hands. To students of this group of animals the work is of interest as recording the occurrence of *Crotalocrinus*, *Pycnosaccus*, and *Corymbocrinus*—genera previously unknown within the limits of the present United States of America. To those whose outlook on palæontology is wider the memoir should appeal as presenting Dr. Weller's views on the distribution of the sea-basins of the Niagara-Wenlock Age. He believes that the Scandinavian and English fauna was connected with that of the Mississippi Valley, by the intervention of a North Polar Sea, more closely than it was with the nearer sea-basin of New York, the latter forming a separate bay, in which the development pursued a somewhat independent course. Among highly specialized forms common to the Mississippian and Scandinavian regions are: the well-known *Crotalocrinus*, so far represented in America only by a meagre fragment; the strange *Petalocrinus*, first made known by Dr. Weller himself, and afterwards elaborately described by Bather; the curious operculate coral *Goniophyllum*; and the little twisted Brachiopod *Streptis*.

A work of this size and importance should certainly have been provided with an index.

# THE ANNALS

AND

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XXX.—*Rhynchotal Notes*.—XVI. Heteroptera : *Family Reduviidæ (continued)*, *Apiomerinæ*, *Harpactorinæ*, and *Nabinæ*. By W. L. DISTANT.

[Concluded from p. 213.]

Genus CYDNOCORIS.

*Cydnocoris gilvus*.

*Myocoris gilvus*, Burm. Trans. Ent. Soc. 1838, p. 104.

*Reduvius erythrinus*, Walk. Cat. Het. vii. p. 200, n. 62 (1873).

*Cydnocoris tabularis*, sp. n.

Sanguineous ; antennæ, eyes and a transverse line between them, anterior margin and angles of anterior pronotal lobe, a spot on anterior lateral margins and two large discal spots to posterior pronotal lobe, a basal spot to scutellum, membrane, apex of rostrum, transverse sublateral spots to sternum and abdomen, a central spot to meso- and metasterna, a double series of discal segmental abdominal spots, and legs (excluding bases of femora) black. Anterior lobe of pronotum strongly sulcate, membrane passing abdominal apex.

*Var.*—Femora (excluding apices) sanguineous.

Long. 15 millim.

*Hab.* Malay Archipelago : Batchian, Gilolo (*Wallace*), Ternate (*J. J. Walker*, Brit. Mus.).

*Ann. & Mag. N. Hist.* Ser. 7. Vol. xi. 18

## Genus HIRANETIS.

*Hiranetis coleopteroides*.

*Reduvius coleopteroides*, Walk. Cat. Het. vii. p. 203. n. 69 (1873).

## Genus HEZA.

*Heza perarmata*.

*Acrocoris perarmata*, Kirby, Tr. Linn. Soc. Lond. viii. p. 72, pl. vi. fig. A (1901).

I have not been able to compare this with all the other Brazilian species of the genus.

## Genus EUAGORAS.

*Euagoras dolosus*.

*Euagoras dolosa*, Stål, Ann. Soc. Ent. Fr. 1863, p. 28. (Type, Brit. Mus.)

Var. *a*.—"Maculis lateralibus disci ventris nigris" (Stål).

Var. *b*.—Resembling var. *a*, but with the legs annulated with black.

This var. was obtained by the 'Challenger' expedition at Aru and is contained in the British Museum collection.

## Genus ENDOCHUS.

*Endochus migratorius*, sp. n.

Pale brownish ochraceous; in fresh specimens the head, pronotum, and corium minutely spotted with cretaceous; in faded or rubbed specimens these small spots are obsolete; eyes, lateral margins and lateral spines to pronotum, and lateral margins of corium black; body beneath, legs, antennæ, and rostrum pale luteous; membrane pale shining ochraceous; antennæ with the apex of second joint black, third and fourth joints roseate, luteous at base. Lateral pronotal spines acute, distinctly directed a little backward, a central sulcate impression on posterior margin of anterior lobe; head spined at antenniferous tubercles.

Long. 14 millim.; exp. pronot. angl. 4 millim.

*Hab.* Hong Kong (*J. J. Walker*, Brit. Mus.). In my own collection are specimens from Ceylon and Tenasserim.

Allied to *E. albomaculatus*, Stål, from which it structurally differs by the backwardly directed pronotal spines.



## Genus EPIDAU.

*Epidau pretiosus*, sp. n.

Bright reddish ochraceous; head, antennæ, rostrum, and legs black; base of head, anterior lobe of pronotum, head beneath, apex of prosternum, disks of meso- and metasterna, disk and apex of abdomen, coxæ, trochanters, and bases of intermediate and posterior femora luteous; corium with a central, discal, transverse, cretaceous spot. Basal joint of antennæ about as long as head, pronotum, and scutellum taken together; ante- and postocular areas of head about equal in length; anterior lobe of pronotum posteriorly broadly sulcate; posterior pronotal lobe with two discal, subacute, tuberculous spines, the lateral angles moderately produced and subacute; membrane pale bronzy, considerably passing abdominal apex.

Long. (incl. membr.) 17 millim.; exp. pronot. angl.  $4\frac{1}{2}$  millim.

*Hab.* New Guinea (*Wallace*, Brit. Mus.).

*Epidau bicolor*, sp. n.

Head, pronotum, scutellum, sternum, coxæ, and anterior femora bright reddish ochraceous; central lobe of head, antennæ, rostrum (excluding apex), corium, membrane, abdomen beneath, apices of anterior femora, anterior tibiæ and tarsi, and the intermediate and posterior legs pale luteous; eyes and apex of rostrum black. Basal joint of antennæ about equal in length to head, pronotum, and scutellum taken together; postocular area of head a little longer than the anteocular portion; anterior lobe of pronotum centrally sulcate; posterior pronotal lobe with two somewhat long and acute tuberculous discal spines, the lateral angles also longly spinously produced, the posterior angles moderately prominent and rounded; membrane about reaching or slightly passing abdominal apex.

Long. 21–22 millim.; exp. pronot. angl.  $6\frac{1}{2}$  millim.

*Hab.* Malabar (*Mesurier*, Brit. Mus.); West China (*Pratt*, Coll. Dist.).

## PLATERUS, gen. nov.

Head long, about or almost as long as the pronotum, postocular portion a little longer and more slender than the anteocular portion, a long oblique suberect spine near the antenniferous tubercles; antennæ mutilated; rostrum with the first joint longer than the second; pronotum subtriangular, the anterior lobe obsoletely tuberculate, its anterior angles

moderately prominent, its posterior area profoundly and broadly sulcate, posterior lobe with the lateral angles longly spinously produced, between which are two long, discal, tuberculous, erect spines; abdomen long, scarcely wider than the hemelytra, the fifth segment a little dilated on each side; legs long, anterior femora a little incrassated and longer than the tibiæ, intermediate and posterior femora and tibiæ of equal length.

Allied to *Epidaus*, but with the spined head of *Cydnocoris*.

*Platerus Pilcheri*, sp. n.

♂. Black; lateral margins of anterior pronotal lobe, a waved transverse fascia to posterior lobe in front of the discal spines, and reticulate markings to corium (excluding base) cretaceous white; three annulations to femora, two to tibiæ, first and second joints of rostrum, and marginal spots to abdomen luteous. Anal appendage in male with two long posteriorly directed spines; lateral pronotal angles strongly spinously produced, their posterior margins distinctly notched near base; membrane fuliginous, inner area black, apical area pale hyaline; base and apex of first joint of rostrum black.

Long. (incl. membr.) 23 millim.; exp. pronot. angl. 7 millim.

*Hab.* Sikkim (*J. G. Pilcher*, Brit. Mus.).

Genus *ASTINUS*.

*Astinus siamensis*, sp. n.

Pale brownish ochraceous; abdomen piceous, its margins and some obscure spots on lateral areas brownish ochraceous; three small rounded spots on anterior margin of posterior pronotal lobe, a spot near each basal angle of scutellum, a transverse spot near base and a larger transverse spot near apex of corium creamy white; membrane pale bronzy. Basal joint of antennæ about as long as head, pronotum, and scutellum taken together; postocular portion of head considerably longer than anteocular portion; frontal lobe of pronotum with the anterior angles produced in short, lateral, conical spines, and with two erect conical spines on disk, between which the surface is centrally sulcate; posterior lobe with two broad, central, laminate, tuberculous elevations, the posterior margins of which are serrate, the lateral angles strongly produced, obtusely angulate and toothed behind,

posterior angles moderately prominent; membrane about reaching apex of abdomen.

Long. 22 millim.; exp. pronot. angl.  $6\frac{1}{2}$  millim.

*Hab.* Siam (Brit. Mus.).

#### Genus PANTHOUS.

##### *Panthous bimaculatus*, sp. n.

Head, pronotum, corium, rostrum, posterior and lateral margins of prosternum, coxæ, and legs dull reddish ochraceous; antennæ, anterior margin of pronotum, scutellum, a central discal spot on each corium, apex of rostrum, and body beneath black; membrane shining, bronzy black; base of first and sometimes also base of second joint of antennæ, extreme apex of abdomen, and lateral margins of fifth and sixth segments reddish ochraceous or luteous. Anterior pronotal lobe strongly tuberculate and excavate; posterior lobe very finely transversely striate, the lateral angles broadly rounded and moderately prominent, the posterior margin strongly produced and nearly covering the scutellum; femora moderately nodulose.

Long. 20–22 millim.; exp. pronot. angl.  $5\frac{1}{2}$ – $6\frac{1}{2}$  millim.

*Hab.* South India: Trivandrum (Atkinson Coll., Brit. Mus.).

#### Genus CORANUS.

##### *Coranus obscurus*.

*Harpactor obscurus*, Kirby, Journ. Linn. Soc., Zool. xxiv. p. 120 (1891).

#### Genus VITUMNUS.

##### *Vitumnus scenicus*.

*Vitumnus scenicus*, Stål, Hem. Afr. iii. p. 70 (1865).

##### *Var. sobrinus*.

*Harpactor sobrinus*, Stål, Cefv. Vet.-Ak. Förh. 1855, p. 41.

*Reduvius negamicus*, Walk. Cat. Het. vii. p. 191. n. 38 (1873).

#### Genus COSMOCLEPTUS.

##### *Cosmocleptus rubromarginatus*, sp. n.

Black; rostrum, first joint of antennæ (remaining joints mutilated), tibiæ, and tarsi ochraceous; margins of connexivum above and beneath broadly carmine-red; corium piceous, membrane fuliginous, with obscure discal and subapical pale spots.

Allied to *C. phemioides*, Stål, but differing, apart from the colour of the rostrum and connexivum, by having the posterior pronotal lobe anteriorly profoundly sulcate, connexivum more dilated, with its lateral margins recurved.

Long., ♂, 28 millim.; max. abd. lat. 15 millim.

*Hab.* Philippine Islands? (*Whitehouse*?, Brit. Mus.).

#### Genus PRISTHESANCUS.

##### *Pristhesancus albipennis*.

*Pristhesancus albipennis*, Walk. Cat. Het. viii. p. 88. n. 8 (1873).

*Helonotus albipennis*, Leth. & Sev. Cat. Gén. Hém. t. iii. p. 193 (1896).

##### *Pristhesancus papuensis*.

*Pristhesancus papuensis*, Stål, Stett. ent. Zeit. xxii. p. 134 (1861).

*Pristhesancus luteicollis*, Walk. Cat. Het. viii. p. 89. n. 10 (1873).

*Helonotus luteicollis*, Leth. & Sev. Cat. Gén. Hém. t. iii. p. 194 (1896).

##### *Pristhesancus plagipennis*.

*Pristhesancus plagipennis*, Walk. Cat. Het. viii. p. 88. n. 9 (1873).

*Helonotus plagipennis*, Leth. & Sev. Cat. Gén. Hém. t. iii. p. 194 (1896).

##### *Pristhesancus Wallacei*, sp. n.

Head, pronotum, scutellum, rostrum, sternum, and legs very dark castaneous or black; corium pale stramineous, infuscated at basal angle; membrane pale hyaline; abdomen above and beneath bright metallic blue, its apex ochraceous, segmental margins beneath greyishly pilose; trochanters sometimes partly ochraceous; antennæ castaneous, antennal tubercles piceous. Anterior pronotal lobe with two conical erectile tubercles, their apices slightly divergent; posterior pronotal lobe broadly centrally sulcate on anterior half, the lateral angles angularly and somewhat conically straightly produced, distinctly notched posteriorly, posterior angles prominent; base of scutellum obliquely erect, its apex tuberculous; membrane passing the apex of abdomen.

Long., ♂ ♀ (incl. apex membr.), 20–22 millim.; exp. pronot. angl.  $6\frac{1}{2}$  millim.

*Hab.* New Guinea (*Wallace*, Brit. Mus.).

#### Genus HELONOTUS.

##### *Helonotus sexspinosus*.

*Zelus sexspinosus*, Fabr. Syst. Rhyng. p. 288 (1803).

Var. *Lanittus vulnerans*, Stål, Stett. ent. Zeit. xxii. p. 134 (1861).

*Helonotus genualis*, Walk. Cat. Het. viii. p. 90. n. 4 (1873).



## Genus PLÆOGASTER.

*Plæogaster pallidulus*.

*Helonotus pallidulus*, Walk. Cat. Het. viii. p. 90. n. 5 (1873).

I have not sufficiently compared this with other described species of the genus to say that it is not a synonym.

## Genus POLIDIUS.

*Polidius australis*, sp. n.

Ochraceous; head, pronotum, two discal fasciæ to scutellum, basal area of clavus, sublateral streak to corium, apical halves of anterior and intermediate femora, apical third of posterior femora, apices of tarsi, and bases of the posterior abdominal spines fuscous; abdomen beneath with a sublateral black marginal fascia.

General structure of *P. armatissimus*, Stål, but differing by the much shorter lateral pronotal spines, the sulcation of the anterior pronotal lobe narrower and more profound, different colour of the head, pronotum, and scutellum.

Long. 10 millim.

Hab. N.W. Australia: Adelaide River (*J. J. Walker*, Brit. Mus.).

## FORESTUS, gen. nov.

Body oblong-ovate; head elongate, central lobe prominent and spinously anteriorly produced, postocular portion longer than anteocular; rostrum with the first joint short, about reaching eyes, second joint twice as long as first; antennæ short, setose, first joint moderately incrassate, about as long as postocular portion of head, second and third joints subequal in length, fourth shortest; pronotum transversely constricted before middle, disk more or less bicarinate, posterior lateral angles more or less prominent; scutellum small, the apex prominent; abdomen more or less lobately produced and distinctly centrally sulcated; femora generally granulous or spinous.

This genus I have placed in the vicinity of *Blapton*, Spin.

*Forestus typicus*, sp. n.

Ochraceous; corium (excluding apical area), membrane, a large spot on fourth and fifth segments of connexivum, base of rostrum, and basal and apical joints of antennæ brownish ochraceous; a lateral fascia to meso- and metanota, anal

appendage (excluding apex), and some minute spots to abdomen piceous. Antennæ longly setose; pronotum with two discal curved carinæ and with two other much more obscure near lateral angles, lateral margins with a series of short robust spines, lateral angles somewhat broadly produced, their apices subtruncate and armed with three spines, their anterior margins also shortly spinous, their posterior margins rounded and centrally concavely notched; connexivum at fourth segment angulately produced, at fifth segment slightly produced, lateral abdominal margins finely spinous and setose; femora coarsely granulate and setose, anterior tibiæ and femora spined beneath; abdomen beneath centrally sulcate, the sulcation with a fine central ridge.

Long.  $12\frac{1}{2}$ –14 millim.; exp. pronot. angl.  $3\frac{1}{2}$ –4 millim.

*Hab.* Sikhim, Mungphu (*Atkinson*, Brit. Mus.).

*Forestus montanus*, sp. n.

♂. Piceous brown; a spot between eyes and central line to postocular portion of head, central sulcation to anterior lobe of pronotum, clavus, a spot on apical margin of corium, spots to connexivum, rostrum (excluding apex), and legs more or less distinctly, ochraceous, but in some specimens some of these pale markings become obliterated; body beneath pale brownish, greyishly pilose, the anal appendages piceous; tibiæ annulated with luteous.

♀. Much paler above, the pale spot to corium occupying the whole apical angle.

Allied to the preceding species (*F. typicus*), but differing by the pronotal lateral angles, which are spinous and strongly recurved; the fourth and fifth segments of the connexivum are much less produced; the lateral abdominal margins finely spinous, but much less setose; anterior tibiæ not spined beneath.

Long., ♂ 13, ♀ 16 millim.; exp. pronot. angl., ♂ 4, ♀  $4\frac{3}{4}$  millim.

*Hab.* ♀ (type). Mungphu, in Assam (*Atkinson*, Brit. Mus.). I possess males in my own collection from the Khási Hills.

*Forestus spinosus*, sp. n.

Luteous; a streak on each side of central lobe on ante-ocular portion of head, a broad central longitudinal fascia on postocular portion, clavus (excluding base), and a large spot on fourth and fifth segments of connexivum piceous; membrane pale cupreous.

Allied to *F. montanus* by the spinously recurved lateral pronotal angles, but resembling *F. typicus* by the angulately produced fourth and fifth segments of the connexivum and the very longly spined under surfaces of the anterior femora and tibiae; the upper surfaces of all the femora are also more shortly spinous; the carinae to the pronotum are less pronounced than in either of the two preceding species.

Long., ♀, 14 millim.; exp. pronot. angl. 4 millim.

*Hab.* Sikkim (*Atkinson*, Brit. Mus.).

*Forestus inermis*, sp. n.

Pale brownish ochraceous, sparsely greyishly pilose; connexivum spotted with luteous, membrane cupreous; third joint of antennae (excluding apex) and base of fourth joint luteous. Pronotum with two discal somewhat indistinct carinae, much more distinct on anterior lobe, where there are altogether five carinae, none on posterior lobe near lateral angles, which are only subprominent and not spinous; connexivum produced, but not angulated; legs unarmed, excepting the anterior femora, which have a series of spines beneath.

Long. 13 millim.; exp. pronot. angl. 3 millim.

*Hab.* Assam, Mungphu (*Atkinson*, Brit. Mus.).

NABINÆ.

Genus PAGASA.

*Pagasa ruficeps*.

*Prostemma ruficeps*, Walk. Cat. Het. vii. p. 135. n. 19 (1873).

Genus PROSTEMMA.

*Prostemma carduelis*.

*Prostemma carduelis*, Dohrn, Stett. ent. Zeit. xix. p. 229, pl. i. fig. 8 (1858).

*Prostemma placens*, Walk. Cat. Het. vii. p. 137. n. 27 (1873).

The species queried by Walker as *P. carduelis*, Dohrn, var.?, is typical; his *P. placens* represents two larger specimens of Dohrn's species.

Genus ALLÆORHYNCHUS.

*Allæorhynchus niger*.

*Prostemma nigra*, Walk. Cat. Het. vii. p. 138. n. 29 (1873).

*Summarized Disposition of Walker's Genera and Species  
belonging to the Subfamilies Apiomerinæ, Harpactorinæ,  
and Nabina.*

*Species considered valid and described under correct Genera.*

- Prostemma concinna*, Walk. Cat. Het. vii. p. 136. n. 24 (1873).  
*Nabis mauricus*, Walk. loc. cit. p. 145. n. 41.  
*Apiomerus decorus*, Walk. loc. cit. viii. p. 17. n. 25.  
*Yolinus siamicus*, Walk. loc. cit. p. 79. n. 9.  
*Sycanus marginatus*, Walk. loc. cit. p. 85. n. 32.  
 — *pyrrhomelas*, Walk. loc. cit. n. 33.  
 — *semimarginatus*, Walk. loc. cit. n. 34.  
*Pristhesancus albipennis*, Walk. loc. cit. p. 88. n. 8.  
 — *plagipennis*, Walk. loc. cit. n. 9.

*Species considered valid, but requiring generic revision.*

- Pachynomus zonatus*, Walk. Cat. Het. vii. p. 131. n. 4 (1873), belongs to  
 gen. *Staliastes* (Acanthaspinae).  
*Prostemma luteiceps*, Walk. loc. cit. p. 135. n. 18, belongs to gen. *Pagasa*.  
 — *ruficeps*, Walk. loc. cit. n. 19, belongs to gen. *Pagasa*.  
 — *longiceps*, Walk. loc. cit. p. 137. n. 25, belongs to gen. *Hæmatochares*.  
 — *nigra*, Walk. loc. cit. p. 138. n. 29, " *Allæorhynchus*.  
*Stenopirates collaris*, Walk. loc. cit. p. 139. n. 1, belongs to gen. *Henico-*  
*cephalus* (Henicocephalidæ).  
 — *anthocoroides*, Walk. loc. cit. n. 2, belongs to gen. *Henicocephalus*  
 (Henicocephalidæ).  
*Apiomerus nitidus*, Walk. loc. cit. viii. p. 70. n. 20, belongs to gen. *Vesbius*.  
*Yolinus horrendus*, Walk. loc. cit. p. 79. n. 8, belongs to gen. *Colpochilo-*  
*coris*.  
*Helonotus pallidulus*, Stål, loc. cit. p. 90. n. 5, belongs to gen. *Plæogaster*.

*Species treated as synonymic.*

- Prostemma placens*, Walk. Cat. Het. vii. p. 137. n. 27 (1873), = *Prostemma*  
*carduelis*, Dohrn.  
*Nabis elegans*, Walk. loc. cit. p. 144. n. 31, = *Heræus guttatus*, Dall. (Ly-  
 gæidæ).  
 — *bicolor*, Walk. loc. cit. p. 145. n. 39, = *Paromius piratoides*, Costa  
 (Lygæidæ).  
*Apiomerus bipunctatus*, Walk. loc. cit. viii. p. 70. n. 19, = *Apiomerus ama-*  
*zonus*, Stål.  
 — *erythromelas*, Walk. loc. cit. n. 21 (nom. præocc.), = *Apiomerus*  
*Walkeri*, Leth. & Sev.  
 — *xanthopilus*, Walk. loc. cit. p. 71. n. 22, = *Heniartes productus*,  
 Stål.  
 — *lituratus*, Walk. loc. cit. n. 23, = *Apiomerus lituratus*, Stål.  
 — *lateralis*, Walk. loc. cit. n. 24, = *Apiomerus geniculatus*, Erichs.  
 — *pulchripes*, Walk. loc. cit. p. 72. n. 26, = *Apiomerus nitidicollis*, Stål.  
 — *tarsalis*, Walk. loc. cit. n. 27, = *Apiomerus flavipennis*, Stål.  
 — *subapicalis*, Walk. loc. cit. n. 28, = *Apiomerus apicalis*, Burm.  
*Prionotus patulus*, Walk. loc. cit. p. 76. n. 5, = *Arilus cristatus*, Linn.  
 — *mundus*, Walk. loc. cit. p. 77. n. 6, = *Arilus gallus*, Stål.  
 — *xanthopus*, Walk. loc. cit. n. 7, = *Arilus carinatus*, Forst.



- Yolinus rubrifer*, Walk. loc. cit. p. 78. n. 6, = *Yolinus glagoviæ*, Dohrn.  
*Sycanus incisus*, Walk. loc. cit. p. 84. n. 30, = *Sycanus blennus*, Stål.  
 — *leucomesus*, Walk. loc. cit. n. 31, = *Sycanus collaris*, Fabr.  
 — *miles*, Walk. loc. cit. p. 86. n. 35, = *Sycanus versicolor*, Dohrn.  
 — *turbidus*, Walk. loc. cit. n. 36, = *Sycanus dichotomus*, Stål.  
 — *caliginosus*, Walk. loc. cit. n. 37, = *Sycanus fulvicornis*, Dohrn.  
 — *invisus*, Walk. loc. cit. n. 38, = *Sycanus annulicornis*, Dohrn.  
*Pristhesancus luteicollis*, Walk. loc. cit. p. 89. n. 10, = *Pristhesancus papuensis*, Stål.  
*Helonotus genualis*, Walk. loc. cit. p. 90. n. 4, = *Helonotus sexspinosus*, Fabr., var. *vulnerans*, Stål.

*To be treated as non-existent.*

*Species the types of which are not now to be found in the British Museum.*

- Prostemma nigricans*, Walk. Cat. Het. vii. p. 135. n. 17 (1873).  
*Yolinus albigutta*, Walk. loc. cit. viii. p. 78. n. 7.  
*Sycanus angulifer*, Walk. loc. cit. p. 84. n. 29.

*Still awaiting determination.*

- Reduvius pubicollis*, Walk. Cat. Het. vii. p. 203. n. 70 (1873). *Hab.* unknown.  
*Prostemma tarsalis*, Walk. loc. cit. p. 138. n. 30. *Hab.* New Guinea.

SUPPLEMENTARY NOTES.

Fam. Lygæidæ.

*Paromius piratoides.*

- Plociomerus piratoides*, Costa, Ann. Mus. Nap. ii. p. 78 (1864).  
*Nabis bicolor*, Walk. Cat. Het. vii. p. 145. n. 39 (1873).

Costa gave no locality; Lethierry and Severin in their Catalogue give "I. Philippinæ" as the habitat; Walker's species came from Celebes.

*Heræus guttatus.*

- Orihæa guttatus*, Dall. List Hem. ii. p. 580 (1852).  
*Nabis elegans*, Walk. Cat. Het. vii. p. 144. n. 31 (1873).

Fam. Hydrometridæ.

In these pages (vol. x. p. 173) I drew attention to some synonymy appertaining to a species of *Hydrometra* found in Japan, Bombay, and Ceylon, which left the name *H. albo-lineata*, Scott, the oldest and therefore legitimate name to be used. Since then Dr. Sjöstedt has kindly let me see a cotype of Stål's Philippine species, *H. vittata*, which proves to be conspecific, and therefore again necessitates further synonymic revision, as follows:—

*Hydrometra vittata.**Hydrometra vittata*, Stål, Cefv. Vet.-Ak. Förh. 1870, p. 705.*Limnobates albolineatus*, Scott, Ann. & Mag. Nat. Hist. (4) xiv. p. 447 (1874).*Hydrometra Greeni*, Kirk, Entomol. 1898, p. 2.

## Fam. Reduviidæ.

*EMESINÆ.**Stenolæmus Greeni*, sp. n.

Brownish ochraceous; three pale striæ (one central and two lateral) to intermediate globose portion of the head; pedunculate portion of head and posterior margin of pronotum pale ochraceous; legs luteous, anterior legs considerably but obscurely annulated with pale brownish, intermediate and posterior femora with several brownish annulations, intermediate tibiæ with a subbasal annulation, posterior tibiæ mutilated; antennæ annulated with brownish; tegmina creamy white, with large brown spots, of which the two largest are discal, one apical angular, a smaller spot at inner angle, and a few very small and nebulous on apical area. Pedunculate portion of the head a little shorter than remaining portion; anterior area of the pronotum tricarinate.

Long. 8 millim.

*Hab.* "India" (Brit. Mus.); Ceylon (*Green*, Coll. Dist.).

Allied to *S. crassirostris*, Stål, but with the pedunculated portion of the head considerably longer.

*Stenolæmus Atkinsoni*, sp. n.

Creamy white, longly pilose; antennæ with three broad brownish annulations to first and second joints; head with the eyes piceous and with a pale brownish lateral streak behind eyes, also two central lines of the same colour on the pedunculated portion; basal area of pronotum, three annulations to anterior femora, five annulations to intermediate and posterior femora, three annulations to anterior tibiæ, a subbasal annulation to intermediate and posterior tibiæ, coxal spots, and broken fasciæ to abdomen brownish ochraceous; tegmina tinted with brownish about the veins and with three distinct brown spots—one smallest and discal before centre, one elongate discal, with a pale central vein beyond centre, the third apical, also with a pale vein; pedunculated portion of the head long, about as long as the remaining portion; pronotum with a distinct central carination on anterior area, the lateral angles obtusely tuberculate.

Long. 11 millim.

*Hab.* India: North-west Provinces (*C. Horne*, Brit. Mus.).

## SAICINÆ.

*Polytoxus pallescens*, sp. n.

Pale stramineous; eyes black; legs strongly pilose; pronotal, lateral, and scutellar spines with their apices fuscous; anterior prosternal spines long, robust, prominent; posterior femora about reaching apex of abdomen; anterior pronotal lobe somewhat broadly centrally foveate, with strongly carinate margins; basal joint of antennæ almost as long as posterior femora.

Long. 14 millim.

*Hab.* Ceylon (*Green*, Brit. Mus.).

## STENOPODINÆ.

## Genus ONCOCEPHALUS.

*Oncocephalus naboïdes*.

*Pirates naboïdes*, Walk. Cat. Het. vii. p. 121. n. 80 (1873).

Some confusion is likely to arise around this species. Walker (*loc. cit.* viii. p. 27. n. 17) also described a species from Ceylon under the name of *Oncocephalus naboïdes*, the type of which cannot now be found, and which I therefore, in consideration of Walker's method of describing, propose to treat as non-existent. Lethierry and Severin have included the last description in their Catalogue (t. iii. p. 87), which name can remain, but the reference must be corrected.

## ACANTHASPINÆ.

## Genus INARA.

*Inara flavopicta*.

*Inara flavopicta*, Stål, Œfv. Vet.-Ak. Förh. 1859, p. 190.

*Spiniger limbifer*, Walk. Cat. Het. vii. p. 166. n. 61 (1873).

*Spiniger conflictus*, Walk. *loc. cit.* n. 62.

## Genus STALIASTES.

*Staliastes zonatus*.

*Pachynomus zonatus*, Walk. Cat. Het. vii. p. 131. n. 4 (1873).

*Opinus subater*, Bredd. Abh. Senckenb. Ges. xxv. p. 165 (1900).

## PIRATINÆ.

*Pirates semifasciatus*.

*Reduvius semifasciatus*, Walk. Cat. Het. vii. p. 202. n. 66 (1873).

*Additional Summary.*

*Species considered valid, but requiring generic revision.*

*Reduvius guttatus*, Walk. Cat. Het. vii. p. 181. n. 7 (1873), belongs to gen. *Homalocoris*.

— *semifasciatus*, Walk. loc. cit. p. 202. n. 66, belongs to gen. *Pirates*.

— *coleopteroides*, Walk. loc. cit. p. 203. n. 69, belongs to gen. *Hiragnetis*.

*Species treated as synonymic.*

*Reduvius negamicus*, Walk. Cat. Het. vii. p. 191. n. 38 (1873), = *Vitumnus scenicus*, Stål, var. *sobrinus*, Stål.

— *erythrinus*, Walk. loc. cit. p. 200. n. 61, = *Cydnocoris gilvus*, Burm.

*Spiniger limbifer*, Walk. loc. cit. p. 166. n. 61, = *Inara flavopicta*, Stål.

— *conflictus*, Walk. loc. cit. n. 62, = *Inara flavopicta*, Stål.

XXXI.—*Some new Spiders from the Camaroons collected by*  
*Mr. G. L. Bates.* By R. I. POCKOCK.

So far as arachnological collecting is concerned, Mr. G. L. Bates has lately eclipsed his previous exploits by discovering the Oriental genus *Calommata* in W. Africa. The other new species recorded in these pages need no special mention.

Family *Aviculariidae*.

Genus *BATESIELLA*, nov.

Allied to *Phoneyusa*, but with the protarsal scopula of the first leg covering only the distal half of the segment, of the second covering only the distal third, of the third and fourth occupying only the apical sixth; fourth leg much longer than first, third as long as first; tibia and protarsi of third and fourth furnished with numerous suberect curved bristles, giving a characteristic "bottle-brush" appearance to the segments, the short hairs clothing the segments at the base of these bristles thick and squamuliform.

*Batesiella crinita*, sp. n.

♀.—*Colour* of body mouse-brown; femora of anterior legs and palpi deep greyish brown, the remaining segments noticeably rufescent.

*Carapace* with cephalic region rather high and with deep grooves, as long as patella, tibia, and tarsus of palp, longer



than patella + tibia of first or fourth leg, shorter than protarsus + tarsus of fourth.

*Legs* with inferior apical protarsal spines; no spines on tibiæ; patella + tibia of first and fourth subequal, patella + tibia of third subequal, their sum about equal to the protarsus of this appendage; protarsus of third as long as protarsus + tarsus of second; protarsus of fourth almost as long as patella + tibia of this limb, tarsus of fourth a little more than one third the length of the protarsus; tarsi of third and fourth distally tapering.

*Measurements in millimetres.*—Total length 32; length of carapace 13, palp 19, first leg 29, second 26, third 28, fourth 35.

*Loc.* Efulen, in the Camaroons (*G. L. Bates*).

### Family Atypidæ.

#### Genus CALOMMATA, Luc.

##### *Calommata Simoni*, sp. n.\*

♀. — *Colour.* Carapace clear testaceous, with darker stains on the cephalic region; mandibles pale ochre-yellow, darker externally; labium pale or infusate; legs pale testaceous, with the distal segment sometimes lightly infusate; abdomen dull greyish brown or dirty testaceous.

*Carapace* as in the typical species *C. fulvipes* from the Sunda Islands.

*Mandible* also as in that species, except that the teeth on the lower side form a single row curving inwards at the distal end of the series.

*Labium* and *sternum* as in *C. fulvipes*.

*Palpi* as in the latter, except that the convex elevation at the base of the upperside of the tibia is higher; maxillary process longer and much more strongly curved in its distal portion.

*Legs* of first and second pairs as in *C. fulvipes*; third and fourth pairs also as in that species, but much more thickly spinous.

*Abdomen* as in *C. fulvipes*.

*Measurements in millimetres.*—Total length (large specimen) 26; length of carapace 10, width 7; length of basal segment of mandible 6.5, of fang 8, of palpus 11, first leg 14, second 13, third 14, fourth 15.

*Loc.* Efulen, in the Camaroons (*G. L. Bates*).

\* I have great pleasure in dedicating this species to Mons. E. Simon, as a slight tribute to the industry, ability, and unvarying courtesy to others, with which he has pursued the study of arachnology.

The chief structural differences between *C. fulvipes* and *C. Simoni* may be briefly tabulated as follows:—

- a. The distal teeth of the row running along the underside of the mandible forming an isolated internal series close to the inner fringe of hairs; the posterior (external) edge of the maxillary process forming a concave curve corresponding to the convex curve of the adjacent segments of the palp when the femur of the latter lies vertically; third and fourth legs much less thickly spinous, only about a dozen spines on the anterior side of the tibia of the fourth. *fulvipes.*
- b. Distal teeth on underside of mandible forming a continuous curved series with the remainder, but not reaching the internal fringe; posterior (external) border of maxillary process with its concave curvature much stronger than the convex curvature of the basal segments of the palp when the femur lies vertically, *i. e.* when the apex touches the underside of the femur a space equalling at least half the width of the maxilla separates the two; third and fourth legs much more thickly spinous, about thirty or forty spines on the anterior side of the tibia of the fourth. *Simoni.*

Up to the present time the remarkable and isolated genus *Calommata* of Lucas has been represented by a single species, *C. fulvipes*, Luc., from Java and Sumatra; one, *C. obesum*, from Bankok; one, *C. truculentum*, from Burma; and one, *C. signatum*, from Japan. These forms are not distinguishable by their diagnoses, and are, perhaps, identical. Moreover, the genus was held to be confined to South-eastern Asia\*. Little was it to be expected that it would turn up in tropical West Africa†. Mr. G. L. Bates is to be very much congratulated on this unexpected discovery, which adds one more to the many interesting novelties we owe to his industry.

### Family Pisauridæ.

#### Genus DOLOMEDES, Latr.

##### *Dolomedes actæon*, sp. n.

♀.—*Colour.* Carapace deep brown, obscurely marbled with olive-brown and yellow patches; a large triangular

\* *C. fulvipes* was based upon a specimen alleged to have come from Bahia. In Keyserling's collection, now in the British Museum, there is a specimen ticketed "Bahia," and labelled as Lucas's type. This specimen I cannot distinguish specifically from a Javan specimen in the Museum, which is presumably identical with *Pelecodon sundaica*, Dol.

† Mr. Oldfield Thomas reminds me that this remarkable case of distribution has several parallels amongst the Mammalia, notably that of the rodent *Nannosciurus*, which is represented by species inhabiting Borneo, the Philippines, and the Camaroon district of West Africa.

yellow patch on each side of the posterior slope; legs rather obscurely banded above, with broad alternating darker and lighter bands; upperside of abdomen clothed with short yellowish and olive-brown hairs, forming broad indistinct transverse bands, with specks of brighter yellow hairs forming a narrow interrupted lateral band; ventral surface uniformly olive-yellow, a slightly darker median ventral band on the abdomen, broader in front and margined with an indistinct narrow pale line.

*Carapace* high, flat along the top, a little longer than patella + tibia + tarsus of palp, a little shorter than tibia of third leg and half the length of its tibia + protarsus.

*Vulva* large, the lateral lobes enclosing a more or less oval space occupied by a large sclerite, triangularly pointed and elevated in front and somewhat sharply constricted behind, where it juts between the extremities of the lateral lobes.

*Measurements in millimetres.*—Total length 31; length of carapace 14.5, first leg 64, second 65, third 59, fourth 71.

*Loc.* Efulen, in the Camaroons (*G. L. Bates*).

The difference in colour between the type of this species and that of *D. palpiger* is too great to permit the view that they belong to the same species.

This is the first female example of the genus *Dolomedes* recorded from tropical Africa.

*Dolomedes Batesii*, sp. n.

♀.—*Colour.* Legs banded as in *D. actæon*; carapace without the posterior spots, covered with short greyish-red hairs, mottled, but showing no definite pattern; darker on the middle dorsal line; middle of clypeal area occupied by a broad vertical brown stripe, broader below and set off by the pale hairs clothing the sides of the clypeus.

Apart from colour-differences this species differs from *D. actæon* in having the eyes of the anterior line recurved by their centres instead of straight, the lower edge of the laterals being on a level with the centres of the medians, and their upper edge rather higher than that of the medians.

*Vulva* very large and convex, its central sclerite closing the space except for a triangular area in front, and almost indistinguishably fused to the lateral portions; it is roundish in shape, without any anterior angular process, thus differing markedly from that of *D. actæon*.

*Measurements in millimetres.*—Total length 23; length of carapace 11, first leg 50, second 50, third 45, fourth 57.

*Loc.* Efulen, in the Camaroons (*G. L. Bates*).

*Dolomedes palpiger*, sp. n.

♂.—*Colour*. Integument of carapace ochre-brown, clothed with olive-brown hairs above; clypeus, sides of head, and margins of thoracic portion clothed with white hairs, forming a broad band; mandibles brownish, clothed with longish yellowish-brown hairs; legs yellowish brown, clothed above with reddish-yellow hairs; sternum adorned like the legs; upperside of abdomen dark, clothed with deep golden-brown hairs, with a narrowish white lateral band extending to the spinners; ventral surface olive-brown, with yellowish hairs.

*Carapace* longer than broad, longitudinally flat above, the posterior area abruptly sloped; width equal to the length between the posterior border and the posterior lateral eye; its length about equal to half that of the patella + tibia of second or fourth leg and as that of patella + tibia of palp.

*Palpi* long, reaching apex of patella of first leg; tibia longer than patella, lightly incrassate, armed externally near the apex with a narrow subspiniform process projecting almost at right angles and not abutting against the tarsus, which is as long as the tibia and half the patella, inflated, piriform, and strongly arched.

*Legs* long and slender.

*Measurements in millimetres*.—Total length 20; length of carapace 10, width 8.5; length of palp 19, second leg 54, third 46, fourth 57.

This species may be distinguished from *D. transfuga*, Poc., from the Benito River (P. Z. S. 1899, p. 869), by the form of the tibial apophysis and the slightly longer palpi. In *D. transfuga* the palpi scarcely reach the middle of the patella of the first leg, although in the original description they are in error described as extending past the middle of the tibia.

## Family Heteropodidæ.

## Genus CTENUS.

*Ctenus coccineipes*, sp. n.

♀.—*Colour*. Carapace deep mahogany, clothed with short yellowish-grey hairs; no red hairs on the clypeus or mandibles, the latter shining black in front, with black setæ, covered with greyish pubescence at the sides; sternum and coxæ sooty black; palpi blackish brown; femur with some reddish hairs below; legs blackish, with greyish pubescence above; the femora with a coating of short blood-red hairs



below, deeper in tint on the first and second than on the third and fourth pairs, the scopulæ ashy black; abdomen blackish, covered above with a coating of greyish hairs, laterally and inferiorly with blood-red hairs; some stripes of the same colour on the dorsal surface; the middle line of the ventral surface occupied by a median black band, which gradually expands anteriorly to the width of the epigastric area, which is black.

*Carapace* longitudinally flat above, as long as patella + tibia of third leg, as protarsus of fourth, as tibia of first, as tarsus and protarsus of second, longer than tarsus and protarsus of third.

*Vulva* differing from that of *C. scopulatus*, Poc., from the Benito River (P. Z. S. 1899, p. 871, pl. lvii. fig. 25), in being wider than long, fairly evenly oval transversely, though with an anterior shallow emargination, and in having the lateral uncate processes thinner and much less prominent.

*Measurements in millimetres*.—Total length 29; length of carapace 12, first leg 42, second 40, third 33, fourth 43.

*Loc.* Efulen, in the Camaroons (*G. L. Bates*).

Distinguishable by the brilliant red coloration of the underparts of the femora and abdomen.

*Ctenus Batesii*, sp. n.

♀.—As large as *C. scopulatus*, Poc. (P. Z. S. 1899, p. 871), but much blacker in colour; no red hairs on face or mandibles; legs uniformly dusky except for some coppery hairs at the extremities above; abdomen almost entirely black above, laterally, and below.

*Mandibles* sparsely hairy, highly polished, and blue-black.

*Eyes* of anterior ocular triangle smaller than in *C. scopulatus*, and apparently further apart, the distance between the anterior and posterior medians equalling a diameter of the former.

*Vulva* differing from that of *C. scopulatus* in that the emargination for the lateral uncate process is nearer the middle of the lateral border, the area in front of it being much shorter in *C. Batesii* than in *C. scopulatus*. The vulva is more like that of *C. Kingsleyi*, but is broader, both the anterior "neck" and the posterior portion between the uncate processes being less constricted.

*Measurements in millimetres*.—Total length 31; length of carapace 15, first leg 49, second 45, third 37, fourth 48.

*Loc.* Efulen, in the Camaroons (*G. L. Bates*).

The females of the five large West-African species of

*Ctenus*, of which the types are in the British Museum, may be distinguished as follows:—

- a. Median ventral area of abdomen black.
  - a<sup>1</sup>. Median black area narrow, expanding in front, sharply defined from the more lateral portions of the lower surface; femora crimson beneath ..... *coccineipes*.
  - b<sup>1</sup>. Ventral area of abdomen either entirely black or mostly covered with a broadly parabolic black shield.
    - a<sup>2</sup>. Abdomen almost entirely black, the median ventral area only a little more intense than the rest; mandibles and face without red hairs .... *Batesii*.
    - b<sup>2</sup>. Black shield on ventral area of abdomen broad and sharply contrasted from the rusty red hairs of its lateral and dorsal surface; mandibles and face with red hairs ..... *scopulatus*.
- b. Median ventral area of abdomen brown and ornamented, like the rest of the lower surface, with pale spots running into longitudinal stripes.
  - a<sup>3</sup>. Carapace longer than patella+tibia iii., and equal to protarsus iv. .... *occidentalis*.
  - b<sup>3</sup>. Carapace slightly shorter than patella+tibia iii., and considerably shorter than protarsus iv. .... *Kingsleyi*.

#### Genus TORANIA, Sim.

##### *Torania scutata*, sp. n.

♀.—*Colour*. Integument of carapace pale, with faint dark stripes, clothed with yellowish hairs; ocular area blackish; mandibles pale, with two faint stripes, infuscate distally; palp pale, with black tarsus; legs pale, minutely speckled, with black spines and dark greyish scopulæ; labium, maxillæ, sternum, and underside of coxæ jet-black; lower side of abdomen covered with a jet-black shield, slightly narrowing posteriorly and reaching to the spinners, which are pale; upperside of abdomen covered with hairs of a greyish-yellow hue.

Structurally resembling *T. variata*, Poc., but without anterior spine on patellæ.

♂.—Resembling female in colour, differing from the male of *T. variata*, Poc., in the much wider interval that separates the apices of the two branches of the tibial spur of the palp.

*Measurements in millimetres*.—♀. Total length 15; length of carapace 6, first leg 27, second 29, third 22, fourth 23.

♂. Total length 13; length of carapace 7, first leg 37, second 40, third 30, fourth 31.

*Loc*. Efulen, in the Camaroons (*G. L. Bates*).

Easily to be distinguished from *T. occidentalis* and *variata* by colouring.

XXXII.—*Notes on the Forficularia.*—VII. *Some hitherto unpublished Descriptions of new Species, by the late M. Auguste de Bormans.* By MALCOLM BURR, B.A., F.L.S., F.E.S.

[Concluded from p. 241.]

*Sparatta aculeata*, de Bormans, sp. n.

♀. Long. corp. 9 mm., forc. 3·25 mm.

Tête noire, les 3 premiers articles antennaires (il en reste 12) jaunes, le reste brun. Pronotum roux testacé. Élytres et écaille alaire noires. Pattes roux testacé, avec de longs poils jaunâtres. Abdomen rouge marron clair, les bords latéraux noirâtres avec de longs poils clairs. Dernier segment dorsal carré, avec une courte impression médiane, bord postérieur rugueux. Pygidium bien saillant en aiguille émoussée. Branches de la pince couleur de l'abdomen, triquéto-arrondies, assez grêles, écartées à la base, en arc très allongé, pointes se croisant, arête interne denticulée du tiers aux deux tiers, où se trouve une petite dent; elles sont hérissées de poils clairs.

S. Celebes, Bua Craeng, 5000'. Coll. Brunner, no. 20,868.

*Chelisoches varicornis*, de Bormans, sp. n.

♂. Long. corp. 9 mm., forc. 3·25 mm.

Tête noire, antennes (il reste 15 articles) : les 2 premiers noirs, 3-7 jaune clair, 8, 9 brun foncé, 10, 11 jaune clair, 12-15 brun foncé. Pronotum noir. Élytres et écaille alaire bruns. Pattes brunes, sauf tarses testacés. Abdomen court, ramassé, rouge marron, luisant; dernier segment dorsal grand, carré, au milieu du bord postérieur, les plis longitudinaux ordinaires; pygidium bien visible, court, large, rectangulaire, l'apex entier échancré, triangulaire. Branches de la pince marron, courtes, régulièrement courbées en arc, bien écartées, et très épaisses à la base, triquéto-arrondies, vers le tiers interne, une grosse épine triangulaire aiguë, pointe dirigée vers l'apex et un peu vers le bas.

N. Celèbes, Toli-toli. Coll. Brunner, no. 20,734. Voisin de *Ch. semiluteus*.

*Chelisoches malgachus*, de Bormans, sp. n.

Peu luisant, glabre. Tête brun noir, bouche et palpes fauves; antennes de 22 art. bruns sauf les 18<sup>e</sup>, 19<sup>e</sup> pales. Pronotum brun foncé, plus large et une fois et quart aussi

long, en trapèze élargi à l'apex ; les angles postérieurs arrondis, côtés très étroitement rebordés. Élytres une fois et demie aussi longue que le pronotum, qu'elles débordent modérément ; épaule arrondie, côtés subarqués, bord postérieur droit ; brunes avec une bande jaune médiane sur toute la longueur. Écaille alaire saillante du quart de la longueur de l'élytre, moitié externe jaune, moitié interne brune. Pattes brunes, tarsi plus pâles, jaunâtres. Abdomen marron rougeâtre, se dilatant régulièrement de la base à l'apex ; bord postérieur de chaque segment granulé ; dernier segment dorsal transversal : ♂ en trapèze plus large à l'apex, angles postérieurs tuberculeux, aigus, et bien prononcés, ♀ subrectangulaire, angles postérieurs bien moins accusés. Pygidium brun, ♂ en lame subcarré, un peu échancré sur les côtés, ♀ en lame trapézoïdale, l'apex échancré en triangle. Branches de la pince marron rougeâtre, bien séparés à la base, robustes, larges, un peu déprimées, triquéto-arrondies ; ♂ parallèles, légèrement bisinueuses, pointes mousses, aussi écartées que les bases ; l'arête interne offre un peu avant le milieu une grosse dent suivie de 3 ou 4 autres beaucoup plus petites ; ♀ légèrement bisinueuses mais convergentes, se croisant des les  $\frac{2}{3}$  jusqu'à près le milieu, pointes émoussées, vers le premier tiers l'arête interne est un peu dilatée et denticulée.

Long. corp., ♂ 22 mm., ♀ 19.5 mm. ; l. forc., ♂ 7.5 mm., ♀ 6.5 mm.

Madagascar. (♂ ♀, Musée de Genes ; ♀, coll. mea.)

*Ancistrogaster javanus*, de Bormans, sp. n.

♂. Brunneus, glaber, subnitidus ; antennis, ore, pronoti marginibus tenuibus lateralibus, pedibusque brunneis dilutioribus, forcipe dilute rufo-brunneo ; abdominis segmentis 5, 7, 8 ad apicem lateralem leviter in spinas parvas retrorsum simpliciter curvatas protractis : forcipis crura typica, brevia, robusta, subovata ; margine interno basali sat dilatato sed rotundato muticoque, margine interno toto lævi usque ad apicem typice bicuspidatum.

Long. corp. 9 mm. ; forc. 2.5 mm.

Tête assez bombée, aussi longue que large, brune, luisante ; parties buccales un peu plus claires, sutures indistinctes ; antennes (il reste 11 articles) d'un brun clair et de forme typique (tous les articles, sauf le 2<sup>me</sup> très petit, cylindriques et allongés). Pronotum plus étroit que la tête, plus long que large, subrectangulaire, avec le bord postérieur assez arrondi, assez bombé, luisant, le bord marginal très étroitement rebordé et plus clair. Élytres brunes, de la longueur



du pronotum, tous les côtés obliques, de telle sorte qu'ils laissent voir une sorte de petit écusson. Ailes nulles. Pattes allongées, assez grêles, typiques, d'un brun assez clair. Abdomen bien convexe, s'élargissant et se renflant de la base à la naissance du dernier segment, où sa largeur se trouve doublée; brun, luisant, les plis des 2<sup>me</sup> et 3<sup>me</sup> segments fortement accusés; les segments 5, 6, 7, 8 très courtes et comme rentrés les uns dans les autres, prolongés sur les côtés mais faiblement, en courbe terminée par une petite pointe dirigée en arrière. Dernier segment dorsal typique, trapézoïdal, de moitié plus étroit et plus mince au bord postérieur, légèrement arqué, qu'au bord antérieur; il est lisse, luisant avec la fossette ordinaire au milieu contre le bord postérieur. Pygidium non apparent. Branches de la pince d'un brun rouge clair, courtes pour ce genre, arrondies, robustes, inermes et même lisses, écartées, dilatées, mais non en lame, et presque droites à la base, puis s'amincissant et formant un ovale fermé très peu allongé jusqu'aux pointes doubles en crochets (forme typique) qui se touchent. ♀ inconnue.

Cette espèce remarquable est la première du genre *Ancistrogaster* rencontrée hors de l'Amérique.

"Elle se rapproche de *A. impennis*, de Borm., par le facies, la coloration, la forme des élytres, et de l'abdomen, l'absence des ailes; mais elle est plus petite et en diffère, 1°, par la forme du 4<sup>me</sup> segment dorsal absolument lisse, sans pli spini-forme; 2°, par la pince relativement beaucoup plus courte, sans épine cylindrique au borde interne contre la base et nullement crénelée."

1 ♂, collection Brunner, no. 19,991.

Java occidental; Pengalengan, 4000' (II. Fruhstorfer).

*Opisthocosmia Burri*, de Bormans, sp. n.

Noir de poix luisant, le 7<sup>me</sup> article des antennes (il en reste 7), liseré latéral interne de l'écaille alaire, pattes, testacées. Branches de la pince: ♂ contigues et arquées en dedans de la base au tiers, puis formant un anneau subelliptique, très allongé, bord interne un peu dilaté au tiers au  $\frac{3}{4}$ ; ♀ grêles, subdroites, presque contigues, inermes dans les deux sexes.

Dimensions:—Long. corps ♂ ♀ 6.5–7 mm., de la pince ♂ ♀ 3.5 mm.

Voisin de *O. simplex*.

S. Celebes, Lompa-Battau, 3000'. Coll. Brunner, no. 20,866,

♂ ♀.

Ressemble à *Forficula lugubris*, Dohrn.

*Sphingolabis Brunneri*, de Bormans, sp. n.

Castaneo-rufescens; ore, pronoto, pedibus, antennarum articulis 5 primis, macula media magna oblonga a quarta parte basali elytrorum ad quartam partem apicalem alarum ducta, elytris alisque circum maculam fusco-nigrescentibus, nitidis; abdominis ultimo dorsali segmento postice tumido, tuberculis duobus pliciformibus transversis munito, fusco-castaneo: pygidium crassum, cylindricum, breve, transversum; marginis posteriori mediospinula bifida instructo: forcipis crura robusta, margine externo leviter arcuato, basi distantia necnon lamina intus declivi et parum emarginata, usque ad tertiam partem basalem dilatata, hujus laminæ angulo posteriori interno in dentem recurvum fortem producto; tum margine cruris interno fere semicirculariter emarginato, dente parvo ad medium armato; mucronibus parum acutis, inter se remotis. ♂. (♀ ignota.)

Long. corporis .....	13 mm.
„ pronoti.....	2 „
„ elytr. ....	4 „
„ alarum.....	2.25 „
„ ult. seg. dors. ....	1.25 „
Lat. pronoti .....	1.75 „
„ ult. seg. dors.....	3.40 „

Tête à peu près aussi longue que large, ferrugineuse, plate, déprimée transversalement entre les yeux, sutures indistinctes, bord postérieur très peu échancré, parties buccales, palpes, et les 5 premiers articles des antennes (il en reste 7) testacés, les 2 articles suivants bruns, le tout de forme typique, 4 article plus petit que le 3, et le 5; yeux assez grands, noirs, bien saillants.

Pronotum sensiblement plus étroit que la tête, un peu plus long que large, bord antérieur presque droit, angles un peu arrondis, côtés parallèles, finement rebordés et relevés en gouttière, bord postérieur assez arrondi; sa surface est lisse, presque plane, d'un jaune testacé, une dépression semicirculaire va d'un angle humérale à l'autre, par le milieu du pronotum, qu'une ligne longitudinale médiane bien visible divise en deux.

Élytres d'une longueur double du pronotum, et d'un tiers plus large que celui-ci; elles sont peu bombées, fortement arrondies à l'épaule, leurs côtés droits, légèrement convergents, de sorte qu'elles sont plus étroites à l'apex qu'à l'épaule. Elles sont, ainsi que les ailes, d'un brun noir luisant, formant bordure tout autour d'une grande tache jaune, oblongue, qui part du quart basal de chaque élytre et s'étend sans interruption jusqu'au quart apical de l'aile. Cette tache occupe un peu plus de la moitié de la surface en largeur.

Partie saillante des ailes un peu plus longue que la moitié de l'élytre.

Pattes de forme et dimensions typiques, d'un jaune testacé. Premier article tarsal un peu plus long que le 3<sup>me</sup>, le 2<sup>me</sup> n'est que faiblement dilaté en cœur et guère plus large que les autres ; tous sont couverts en dessous d'une pubescence très épaisse et concolore.

Abdomen dilaté au milieu, peu bombé, luisant, lisse, d'un marron rougeâtre, le plis du 2<sup>de</sup> et 3<sup>me</sup> segment concolores. Dernier segment transversal et rectangulaire, d'une largeur double de sa longueur, assez plat, lisse, d'un marron foncé, le bord postérieur épaisse en bourrelet avec une courte impression triangulaire à chaque angle. Le bord antérieur du bourrelet est formé par un repli transversal, qui se termine de chaque côté au dessus du milieu de la racine de la pince en un petit tubercule pointu ; ce repli est coupé perpendiculairement en son milieu par un sillon très court et assez profond.

Dessous de tout le corps testacé, sauf les premiers segments et la pince.

Penultième segment ventral grand, transversal, sa moitié antérieure rectangulaire, sa moitié postérieure semicirculaire, lisse, assez plate, couleur marron. Il couvre entièrement le dernier, sauf un très petit triangle de chaque côté.

Pygidium bien distinct, en bourrelet transversal, luisant, trois fois aussi large que long. Au milieu du bord postérieur part une petite épine noire bifide, bien distincte, et dirigée horizontalement en arrière.

Branches de la pince d'un marron ferrugineux, en dessus et en dessous plates, robustes, leur bord externe formant une courbe elliptique régulière. Elles sont écartées à la base, et de ce point au tiers de leur longueur dilatées en lame décline en dedans, dont le bord est faiblement échancré ; le bord interne de cette lame se termine par une forte dent plate et recourbée. A partir de ce point le bord interne forme une courbe presque semicirculaire jusqu'aux pointes écartées et émoussées, vers le tiers basal de cette courbure se présente une toute petite dent noirâtre.

*Habitat.* Hautes Amazon.

1 ♂, coll. Brunner, no. 15,485.

Cette espèce est voisine de *Sph. versicolor*, de Bormans, et *Sph. speculigera*, Stål, mais bien distincte de l'une et de l'autre par sa coloration, la forme de la pince, etc.

*Forficula miranda*, sp. n.

♂. Long. corp. 10 mm., forcip. 6 mm., pygid. 2.25 mm.

Glabre, luisant. Tête, pronotum, élytres, brun testacé, bouche, palpes et 2 premiers articles des antennes testacés, les autres (il rest 11 articles) bruns. Élytres de la longueur du pronotum. Écaille alaire nulle. Pattes testacées (2<sup>me</sup> article tarsal typique mais petit). Abdomen étroit à la base, se dilatant et se renflant fortement jusqu'au milieu, puis s'atteignant un peu vers l'apex. Les 2 plis latéraux peu accusés. Dernier segment dorsal rectangulaire, beaucoup plus large que long. Branches de la pince testacées, rougeâtres, subcontigues à la base mais enchassant entre elles le pygidium étroit triangulaire, la point dirigée vers l'apex, très long, 2<sup>me</sup>  $\frac{1}{4}$  assez dilaté en dedans et plat jusqu'au au bout du pygidium, cette dilatation finissant en épine comme chez *F. auricularia* etc. ; puis en arc d'ellipse allongé, arrondies, minces, vers le  $\frac{3}{4}$  le bord interne présente une petite dent plus foncée ainsi que les pointes.

Lombok, Sambalan, 4000'. Coll. Brunner, no. 21,349.

Dormans Park, East Grinstead,  
December 1902.

XXXIII.—*Notes on the Forficularia.*—VIII. *Five new Species from the de Bormans Collection.* By MALCOLM BURR, B.A., F.L.S., F.E.S.

THE following five species have received manuscript names from de Bormans, but no descriptions have been either drawn up or published.

*Anisolabis Dubronyi*, Kirby.

Statura majore; colore rufo-nigro, capite rufo-ferrugineo, pedibus testaceis; antennæ 21-segmentatæ, typicæ, fusco-brunneæ: abdomen minutissime punctulatum, vel vix perspicue, plicis lateralibus indistinctis; segmentum ultimum dorsale magnum, rectangulare, quadratum, etiam minutissime punctulatum, sulculo medio impresso; venter lævis; segmentum penultimum ventrale minutissime punctulatum, obtuso-triangulare, apice rotundatum, segmentum ultimum angulos liberans, lineis longitudinalibus 6 indistinctis instructum: pygidium haud perspicuum: forcipis brachia valida, triquetra, inermia, recta quam sinistra fortius incurva. ♂. ♀ ignota.

Long. corporis . . . . . 20·25 mm.  
,, forcipis . . . . . 4 „



*Colour* entirely dark reddish black except the head and feet.

*Head* ferruginous, the sutures indistinct; mouth-parts blackish, palpi testaceous; antennæ 21-segmentate, typical of the genus, dark brown.

*Pronotum* square, longer than broad, slightly broader posteriorly than anteriorly, anterior and posterior margins straight, angles rounded, slightly tumid, the sides very slightly elevated.

*Mesonotum* square, simple, nearly as long as broad.

*Metanotum* transverse, posterior border roundly emarginate.

*Feet* uniform testaceous.

*Abdomen* extremely finely punctulated, almost smooth, the lateral tubercles very faint; last abdominal dorsal segment large, square, also extremely finely punctulated, with a very faint median longitudinal line; penultimate ventral segment also very finely punctulated, obtusely triangular, rounded at the posterior margin, exposing the lateral corners of the last segment; the rest of the venter quite smooth.

*Pygidium* not apparent.

*Forceps* with the branches stout, triquetre, blackish red, darker towards the apex, unarmed except for a few fine denticulations on the inner margin; the right branch is strongly curved in above the left, which is much less strongly curved. ♂.

♀ unknown.

*Habitat.* Tenasserim: Mt. Moolesit, 1000–1900 metres, in April (*de Bormans*).

*Anisolabis læta*, de Bormans, 1888, Ann. Mus. Civ. Gen. (2) vi. p. 435; id. (2) xiv. 1894, p. 379 (nec Gerstaecker); id. (partim) de Bormans, 1900, Tierreich, 11 Lief., Orth. p. 46.

*Anisolabis Dubronii*, Kirby, 1903, Ann. & Mag. Nat. Hist. (7) xi. p. 68.

Mr. Kirby has pointed out that de Bormans's specimens from Tenasserim are distinct from Gerstaecker's *A. læta*, described from Kilimandscharo. Gerstaecker only described the female; but the Burmese specimens of de Bormans's collection, of which one—the type of *A. Dubronyi*—is in the British Museum and another in my collection, do not perfectly agree with Gerstaecker's description. The two differ as follows:—

	<i>A. læta</i> .	<i>A. Dubronyi</i> .
Mouth .....	Red.	Blackish.
Last dorsal segment .....	Strongly rugulose.	Very finely punctulate.
Venter .....	Finely punctulate.	Quite smooth.
Penultimate ventral segment.	Almost smooth.	Finely punctulate, with six longitudinal lines.
Length of body .....	15 mm. (♀).	20.25 mm. (♂).
Habitat .....	Tenasserim.	West Africa.

The ♂ of the true *A. læta* is unknown.

*Gonolabis inca*, sp. n.

Statura minore; colore toto sordide fusco-testaceo; glabra: abdomen apice sat dilatatum, segmento ultimo dorsali lævi: forcipis braccia ♂ basi remota, inermia, rotundata, regulariter incurvata, sed braccia sinistra quam dextra subfortius incurvata; ♀ brevissima, conica, basi subcontigua, valde incurvata ac decussata: pygidium ♂ haud perspicuum, ♀ minimum, acutum, spiniforme. ♂ ♀.

Long. corporis ..... 8 mm.  
 „ forcipis ..... 0.75 „

Small, smooth, dirty dark testaceous in colour, darker posteriorly than anteriorly, glabrous.

*Head* dark brown; sutures not visible; eyes small, black; antennæ (?) 20-segmentate, the first very large and stout, the second very small, third larger and longer, the fourth again smaller, scarcely larger than the second; fifth, sixth, seventh very slightly longer each than the previous one, from these gradually lengthening; brown.

*Pronotum* as broad as the head, oblong, smooth, the sides straight, convex, with a very faint median sulculus hardly visible; lateral margins very narrowly flattened.

*Mesonotum* very narrow and broad.

*Metanotum* very narrow, transverse, roundly emarginate posteriorly.

*Elytra* and wings entirely absent, no traces.

*Feet* typical, dull testaceous.

*Abdomen* darker brown than the anterior part of the body, smooth; lateral tubercles only visible on the third segment, extremely faint; abdomen gradually dilated towards the apex, where it is slightly less than twice as broad as at the first segment in the ♂; in the ♀ it is a little broader at the first segment, slightly dilated as far as the sixth segment, then attenuated slightly; last dorsal segment ♂ large, transverse, rectangular, smooth, with a barely distinguishable obsolete tubercle over the insertion of the forceps at each side;

in the ♀ smaller, narrower; venter rich brown, smooth, shining; penultimate ventral segment ♂ large, broad, short, rounded posteriorly, exposing the last segment at the angles.

*Pygidium* ♂ not visible; ♀ very short, sharp point.

*Forceps* with branches: ♂ remote at the base, smooth, unarmed, round, short, gradually and regularly incurved, the left branch very slightly more incurved than the right; the apices decussate, the left branch above the right; in the ♀ the branches are very short, conical, subcontiguous, round, unarmed, strongly incurved and decussating, the right branch above the left; the points themselves are comparatively blunt in the ♂ and sharper in the ♀.

*Habitat.* Peru, 1 ♂, 1 ♀ (♂ from Bolivar, ♀ from de Saussure); Obrajillo, Cordilleras de Pérou, 1 ♂ (*Jelski*). (All three in my collection, ex coll. de Bormans.)

Not closely allied to any described species; smaller than *G. lativentris* and much less strongly dilated; it falls nearest perhaps to the Asiatic *G. sumatrana*, Borm. I can find no reference to it in de Bormans's notes. It bears a superficial resemblance to *Strongylopsalis inca*, Burr, but has no traces of organs of flight.

*Labia canaca*, sp. n.

Corpus angustum, elongatum; colorē toto rufo-testaceo; elytra alæque perfecte explicatæ: pygidium breve, subtus profunde sulcatum, margine postico triangulariter excisum, lobos duos triangulares acutos formanti: forcipis brachia basi remota, valida, triquetra, leviter incurva, apicibus attingentibus, dimidio apicali margine interno fortiter denticulato. ♂. ♀ ignota.

Long. corporis..... 9 mm.

„ forcipis ..... 2 „

*Head* slightly darker, sutures obsolete; antennæ typical, with 12 segments.

*Pronotum* slightly narrower than the head, widening posteriorly, anterior margin subrotundate; lateral margins straight, slightly diverging; posterior margin rounded; anterior portion very slightly raised; a few long bristles are visible at the shoulders.

*Elytra* fulvous testaceous, truncated at the apex.

*Wings* long, of the same colour as the elytra.

*Feet* paler testaceous.

*Abdomen* long and slender; lateral tubercles faint, darker in colour than the rest of the abdomen, which is reddish; extremely finely punctulated, almost smooth; clothed at the

sides with a very fine, very short, yellow pubescence and a few long stiff bristles. Last abdominal segment large, smooth, rectangular, slightly narrower posteriorly, with a very small tubercle in the middle of the hinder margin; penultimate ventral segment very large, rounded, slightly roundly emarginate in the posterior margin.

*Pygidium* short, stout, deeply furrowed beneath, narrower at the base than the apex, which is triangularly emarginate and produced into a short triangular lobe on each side of this excision. The pygidium is better seen from beneath than from above.

*Forceps* with the branches stout, triquetre, remote at the base, reddish, darker apically, nearly straight, gradually incurved, to meet at the apex; unarmed in the basal half, with a small tooth on the inner margin in the middle; beyond this tooth fairly strongly denticulated on the inner margin down to the apex. Covered with short fine yellow pubescence.

*Habitat.* New Caledonia, Noumea. (Type, 1 ♂, in Brit. Mus.; 1 ♂ in my collection.)

This species was named, but not described, by de Bormans; it falls into the group of elongated species with prominent pygidium: it falls nearest to *L. pygidiata* and *L. ridens*, Borm.; its uniform reddish-testaceous colour distinguishes it at a glance from either of these, and the form of the pygidium is very characteristic, as also of the forceps.

*Chelisoches vittatus*, sp. n.

Statura mediocri; caput rufum; antennæ 17-segmentatæ, nigræ, ante apicem albo-annulatæ: pronotum nigrum, testaceo-variegatum: elytra alæque testacea, nigro-vittata: pedes testacei: abdomen nigrum; segmentum ultimum dorsale transversum, rectangulare, medio impresso: pygidium breve, vix perspicuum, medio emarginato: forcipis brachia basi remota, valida, basi dilatata, hac parte dilatata in dentem validum, longum, acutum, postice spectantem producta, dehinc gracilia, inermia, leviter incurva. ♂. ♀ ignota.

Long. corporis ..... 12·75 mm.  
 „ forcipis ..... 7·25 „

*Head* clear red, sutures obsolete; eyes small, black.

*Antennæ* with 17 segments, all black except 11 and 12, which are clear white; the first segment is large and stout, 2 minute, 3 considerably longer; 4, 5, and 6 small, round, almost knotted, the remainder gradually lengthening.

*Pronotum* as broad as the head, black, laterally and posteriorly bordered with fulvous; the anterior margin straight,



the sides slightly diverging posteriorly, the posterior margin well rounded; the anterior half slightly elevated and tumid, the posterior portion flattened.

*Elytra* broad, smooth, short, truncated at the apex, testaceous or fulvous, with two broad, longitudinal, black bands—one on the inner, one on the outer margin.

*Wings* well developed, smooth, black, broadly banded with fulvous exteriorly.

*Feet* uniform fulvo-testaceous.

*Abdomen* black, tinged with dark reddish; lateral tubercles distinct, rather broad, extremely finely granulated; last dorsal segment rectangular, transverse, tumid over the insertion of the forceps, with a square depression in the middle of the posterior margin; penultimate ventral segment very large, entirely covering the last segment, rounded, faintly emarginate in the middle of the posterior margin.

*Pygidium* very short, not projecting beyond the penultimate ventral segment, transverse, faintly emarginate in the middle.

*Forceps* reddish black, the branches remote at the base, stout, dilated in the basal third; the dilated part is terminated by a long, stout, very sharp tooth on the inner margin, pointing towards the apex; beyond this the branches are more slender, not dilated, smooth, unarmed, simply incurved, the apices meeting; the whole forceps is slightly bent downwards.

*Patria.* West Africa, Ogowe (type, in British Museum, ex coll. de Bormans): River Niger, Oguega (coll. mea). Both ♂ ♂.

♀ unknown.

The last entry in de Bormans's notes is the name of this species, with the first words of the description; these are probably the last entomological words he ever wrote, for the paralysis struck him down before he could complete it. The type, labelled by him under this MS. name, is in the British Museum, and I have a single male in my collection.

It is, perhaps, most nearly allied to *Ch. plagiatus*, also an African species, which it resembles in being brightly coloured. It is, however, a very distinct form and not likely to be confused with any known species.

*Chelidura Peringueyi*, sp. n.

Statura minore; colore rufo-testaceo, fusco-variegato; antennæ 12-segmentatæ; pronotum quadratum; scutellum perspicuum, parvum; elytra rudimentaria, haud libera, brevia, transversa; pedes testacei: abdomen fusco-rufum, ♂ apicem versus paullo

dilatatum, ♀ vix dilatatum, apice attenuatum; tuberculis lateralibus distinctis, atro-circumdatis; segmentum ultimum dorsale, ♂ transversum, rectangulare, margine postico sulculo medio impresso, tuberculo parvo supra insertionem forcipis utrinque instructum; ♀ parvum, attenuatum, tuberculis obsoletis: pygidium ♂ brevissime, rectangulare, multo latius quam longius, medio spinula parva acuta armatum; ♀ haud perspicuum: forcipis brachia, ♂ basi remota, valida, margine interno prope basin minute denticulata, dimidio basali recta, dehinc attenuata, sensim incurvata, apicibus haud attingentibus; ♀ recta, simplicia, inermia. ♂ ♀.

	♂.	♀.
Long. corporis . . . . .	19 mm.	19·5–21 mm.
„ forcipis . . . . .	2 „	1·25–1·5 „

*Head* clear brick-red, sutures not distinct; eyes small, black; antennæ typical, with 12 segments, clear testaceous.

*Pronotum* square, very slightly narrower than the head anteriorly, slightly broader posteriorly, the whole surface slightly convex, posterior margin straight.

*Mesonotum* covered by the elytra; scutellum minute, but visible between the elytra at their base, triangular, transverse.

*Elytra* rudimentary, not free, transversely triangular, the suture being the juxtaposition of their apices.

*Wings* wanting.

*Metanotum* narrow, roundly emarginate posteriorly.

*Feet* typical, clear testaceous; lobe of second tarsal segment distinct.

*Abdomen* slightly dilated posteriorly in the ♂, attenuated in the ♀; lateral tubercles very strongly marked, shaded round with deep black; last dorsal segment in the ♂ rectangular, the hinder margin unbroken, with a blunt tubercle over the insertion of each branch of the forceps; in the ♀ small, attenuated, with no tubercles visible; penultimate ventral segment ♀ large, entirely round, completely covering the last segment.

*Pygidium* ♂ very short, transverse, very broad, rectangular, with a short sharp spine in the middle of the hinder border, horizontal; in the ♀ not apparent.

*Forceps* with the branches in the ♂ remote at the base, stout, somewhat dilated in the basal part, and very finely denticulated there on the inner margin, straight in the first half, then attenuated and slightly incurved, the apices not meeting; in the ♀ straight, contiguous, simple, unarmed; entirely brick-red.

In colour the anterior part of the body is yellowish

testaceous, the posterior part deep red shaded with black; the whole body smooth and glabrous.

*Habitat.* Cape of Good Hope (*Peringuey*). 1 ♂, 4 ♀, one larva in my collection.

In size and in appearance most nearly resembles *Ch. Bolivari*, Dubr.; it is distinguished, among other things, by the form of the pygidium of the ♂. It is the first species of the genus discovered in Africa. The specimens are labelled under this name by de Bormans, but I can find no reference to it in any of his notes or letters except a drawing in the "album."

The single male is carded, so it is impossible to examine the ventral surface.

Dormans Park, East Grinstead,  
December 1902.

#### XXXIV.—A Revision of the Fishes of the Family Lophiidae. By C. TATE REGAN, B.A.

THE Lophiidae, as here understood, are equivalent to the genus *Lophius*, Linn., as restricted by Cuvier and accepted by Günther, and may be defined as Pediculates\* with large depressed head, wide mouth, three gills, pseudobranchiae, pectorals each supported by a pair of basal bones, and ventrals with one spine and five soft rays. In the present paper twelve or thirteen species are recognized as probably distinct, of which eight are represented in the British Museum collection, including three which are described below as new to science. These species are grouped into three genera—*Chirolophius*, gen. nov., *Lophiomus*, Gill, and *Lophius*, Linn.,—the first being characterized by the position of the gill-

\* The definition of the Pediculati given by Messrs. Jordan and Sindo (Proc. U.S. Nat. Mus. xxiv. 1902, p. 361) is applicable to the Lophiidae with the exception of the phrase "Upper pharyngeals 2, similar, spatulate, with anterior stem and transverse blade." *Lophius piscatorius* has four branchial arches, the fourth without a gill, the first three bearing gills in their lower halves only. The first three epibranchials are united, but the limits of each can be distinguished; the first is about  $\frac{2}{3}$  as long as the second, to the basal part of which it is joined, and its upper pharyngeal is wanting; the second and third separate superiorly, and each bears an upper pharyngeal, as does the fourth epibranchial, which is strong, and at its upper end united to the third. The three upper pharyngeals on each side are coalescent; the last bears hardly any teeth, but is as well developed as the two preceding it, which are strongly toothed. The "anterior stems" are obviously the epibranchials, the first three uniting to form one "stem," the fourth being the other.

openings, which in part lie in front of and above the pectorals, differing in this respect from *Lophiomus* and *Lophius*, in which the gill-openings are entirely below and behind the pectorals. *Chirolophius* and *Lophiomus* agree in having about nineteen vertebræ, the teeth in the lower jaw in three or four series, and also the last ray of the dorsal and anal cleft to the base, but borne by a single basal bone, whereas *Lophius* has the vertebræ in increased number, about two series of teeth in the lower jaw, and the last ray of dorsal and anal simple. The gill-openings in *Chirolophius* resemble those of more normal fishes with regard to their position, and the nature of the last dorsal and anal rays also seems to indicate that in this family the most specialized forms are those with the vertebræ in increased number.

There are many features which are common to all the fishes of the family which it is superfluous to repeat in specific descriptions: the ridges and spines borne by the bones of the head, more prominent in young examples than in adults, are constant in position, as are the rays of the spinous dorsal, of which the first two are supported by a single movable basal bone which lies between the posterior processes of the premaxillaries, the third is situated on the head behind the level of the eyes, and the other rays, one to three in number, form a more or less continuous fin behind the head. The lower jaw has always an outer series of fixed teeth, wanting anteriorly, increasing in size posteriorly, and internal to these a number of pointed, hinged, depressible teeth, anteriorly in two to five series, posteriorly in one or two, the inner teeth being the longest. The premaxillaries have posteriorly a single series of small fixed teeth, and anteriorly a double series of depressible teeth, those of the inner series being the longest. The palatines have each a few teeth in a single series, the anterior of which are enlarged. The sub-spherical nasal sacs are very similar to those of some Tetrodonts, in all cases the anterior nostril is on the front side, the posterior on the top of the sac. The projecting lower jaw causes the exposure of the anterior part of the floor of the buccal cavity; on this account the velum of the lower jaw and the anterior part of the tongue, except the margin, which is concealed beneath the velum, have a similar colour to the upper surface of the body.

The characters which seem of most use in determining species are the number of rays in the dorsal, anal, and pectoral fins, the length of the rays of the spinous dorsal (the first ray seems to become relatively longer during growth, but if, as frequently happens, it is broken off, a fresh flap



develops at its end; the posterior rays become more and more concealed with increase in size), the length and shape of the humeral spine, the size and number of the teeth, and the size of the eye, but all these features are subject to considerable variation.

*Synopsis of the Genera.*

- |  |                                |
|--|--------------------------------|
| I. Gill-openings partly below, partly in front of and above the pectorals. Teeth in the lower jaw mostly in 3 or 4 series; about 19 vertebrae..... | 1. <i>Chirolophius</i> , g. n. |
| II. Gill-openings entirely below or behind the pectorals.  |                                |
| A. Teeth in the lower jaw mostly in 3 series; about 19 vertebrae .....   | 2. <i>Lophiomus</i> , Gill.    |
| B. Teeth in the lower jaw mostly in 2 series; 27-32 vertebrae .....  | 3. <i>Lophius</i> , Linn.      |

*CHIROLOPHIUS*, gen. nov.

Teeth in the lower jaw mostly in 3 series, anteriorly in 4 or 5 series; opercular membrane with a free posterior margin; gill-openings extending on to the upper surface in front of the pectorals; pectorals with 13-18 rays, posterior to the gill-openings. Dorsal with IV-VI, 7-9 rays, anal with 5-6, the last ray of each cleft to the base and supported by a single basal bone. Vertebrae about 19.

The three species of this genus which are represented in the British Museum are described below under the names *Ch. Naresii*, Günther, *Ch. Moseleyi*, sp. n., and *Ch. Murrayi*, sp. n. The following also appear to belong to this genus:—*Lophius gracilimanus*, *mutilus*, and *lugubris*, Alcock, and *Lophiomus spilurus*, Garman.

Three specimens taken by the 'Challenger' were described by Dr. Günther under the name *Lophius Naresii*, after Sir George Nares. They appear to me each to belong to distinct but closely allied species, and the largest example, from the Philippines, figured in the "'Challenger' Shore-Fishes," pl. xxv., must be regarded as the type of *Ch. Naresii*. This figure is excellent, except for the fact that the last dorsal ray is represented as simple instead of being cleft to the base.

In all three species the head is longer than broad, the angle of the mandible is on a level with the hind margin of the eye, the humeral spine is simple, the spines borne by the palatines, just behind the anterior ends of the maxillaries, are three in number on each side (the first very small, the last the longest), and the supraorbital ridge is elevated and dentated.

There are VI, 8 dorsal and 6 anal rays, the first ray of the spinous dorsal simple and ending in a flap, the others fringed. There are two teeth on each side of the vomer.

*Chirolophius Naresii*, Günther.

The single specimen was taken at the Philippines at a depth of 115 fathoms. The humeral spine is curved upwards; the pectoral rays number 14; the posterior series of fixed teeth of the premaxillary are 13 in number. The principal measurements are:—Total length with caudal, 276 mm.; length without caudal, 220 mm.; length of head, 128 mm.; snout, 28 mm.; eye diameter, 19 mm.; interorbital width, 19 mm.; length of humeral spine, 13 mm.; length of rays of spinous dorsal, I, 67 mm., II, 60 mm., III, 90 mm., IV, 76 mm., V, 64 mm., and VI, 31 mm. Colour: brownish above, lighter below; dorsal pale, unspotted; caudal mottled with blackish.

*Chirolophius Moseleyi*, sp. n.

This species is based on a single small specimen obtained to the north of New Guinea at a depth of 152 fathoms. It differs from the preceding in having a long straight humeral spine, second ray of spinous dorsal and caudal longer, snout somewhat longer, and, considering the difference in size of the specimens, it would seem that the eyes are smaller and the interorbital space wider in this species. The principal measurements are:—Total length with caudal, 80 mm.; length without caudal, 60 mm.; length of head, 36 mm.; snout, 9 mm.; eye diameter, 6 mm.; interorbital width, 6 mm.; humeral spine, 5 mm.; length of rays of spinous dorsal, I, 18 mm., II, 31 mm., III, 25 mm., IV, 18 mm., V, 13 mm., and VI, 7 mm. Colour: brownish above, lighter below; dorsal light, with rows of dark spots; caudal pale, immaculate.

Named in memory of the late Professor Moseley.

*Chirolophius Murrayi*, sp. n.

The single example of this species was taken at Nares Harbour, Admiralty Islands. The pectorals have 18 rays, instead of 14 as in the two preceding species. The simple humeral spine is curved backwards. The snout is shorter, eyes larger, and interorbital space narrower than in *C. Naresii*, and the relative length of the rays of the spinous dorsal is also quite different. The principal measurements are:—Total length with caudal, 205 mm.; length without caudal, 160 mm.; length of head, 95 mm.; snout, 16 mm.; eye

diameter, 17 mm.; interorbital width, 13 mm.; humeral spine, 13 mm.; length of rays of spinous dorsal, I, 85 mm., II, 48 mm., III, 55 mm., IV, 36 mm., V, 24 mm., and VI, 18 mm. Colour: brownish above, lighter below; dorsal and caudal barred with rows of dark spots.

Named after Sir John Murray.

The following three species, described by Dr. Alcock in the 'Catalogue of Indian Deep-sea Fishes,' and figured in the 'Illustrations of the Zoology of the Investigator,' seem undoubtedly to belong to the genus *Chirolophius*.

*Chirolophius gracilimanus*, Alcock.

This species is described from three specimens, the largest  $4\frac{1}{2}$  inches long, from off the Malabar coast; it is evidently very close to *C. Moseleyi*, but has the humeral spine truncate and bifid, the second ray of the spinous dorsal not fringed, and the pectoral rays 18 in number.

*Chirolophius mutilus*, Alcock.

D. V, 8-9; A. 5; P. 15; second part of spinous dorsal composed of two small rays only visible after dissection; supraorbital ridge with 3 teeth, eyes large, humeral spine trifid. One specimen,  $5\frac{1}{4}$  inches long, from the Bay of Bengal.

*Chirolophius lugubris*, Alcock.

D. IV, 7-8; A. 5-6; P. 13; differs from the preceding species in having a smaller eye, and the second part of the spinous dorsal reduced to a single slender ray, not hidden. Three specimens, the largest  $5\frac{1}{2}$  inches long, from off Colombo.

The following species from the Pacific, off the coast of Central America, is described by Dr. S. Garman in the 'Albatross' report. It seems to be pretty certainly a *Chirolophius*, perhaps closely allied to *C. Murrayi*.

*Chirolophius spilurus*, Garman.

Head longer than broad, eyes large, the snout as long as the eye, humeral spine simple. D. VI, 8; A. 6; P. 17; second ray of spinous dorsal longer than the first, which is slender, without a flap. 18 vertebrae.

## LOPHIOMUS, Gill\*.

Teeth in the lower jaw mostly in 3 series, anteriorly in 4-5 series; opercular membrane without free posterior margin; gill-openings wide, below the pectorals and extending beyond them posteriorly; pectorals broad, with 22-23 rays, their bases can be received within the gill-openings. Dorsal with about VI, 8 rays, anal with about 6, the last ray of each being cleft to the base and supported by a single basal bone. Vertebrae about 19.

There is only one well-established species which certainly belongs to this genus, viz., *Lophiomus setigerus*, Wahl. After examining examples of *Lophius indicus*, Alcock, I have no hesitation in pronouncing them to belong to *L. setigerus*, as Dr. Alcock himself suggested might prove to be the case. Sir Andrew Smith's description of *Lophius upsicephalus* from the Cape of Good Hope is, so far as it goes, perfectly applicable to *L. setigerus*; and I have examined a large stuffed specimen of *L. upsicephalus* from Sir A. Smith's collection, in which the number of dorsal, anal, and pectoral rays is the same as in *L. setigerus*, with which it also agrees in the general form of the body and in the dentition; in this specimen the humeral spine is wanting. Several examples of *L. setigerus* show that during growth the posterior or lateral series of small fixed teeth in the premaxillaries increases owing to the appearance of additional teeth at its anterior end; thus a specimen 150 mm. long has 8-9 teeth in this series on each side, occupying the posterior third of the length of the premaxillaries, one 200 mm. has 12-13, and one 400 mm., 19-21, now extending over more than half the length of the bone. The example of *L. upsicephalus* is 1040 mm. long and these teeth occupy  $\frac{3}{4}$  of the length of the bone, and are 31-34 in number. So far as is known, then, *L. upsicephalus* is not distinct from *L. setigerus*; and as this species is now known to range from the Malabar Coast to the Seas of China and Japan, its occurrence at the Cape of Good Hope cannot be regarded as surprising.

I have examined ten examples of *L. setigerus*; the head is as broad as long, and equal to about half the total length, without caudal; there are VI, 8 dorsal, 6 anal, and 22-23 pectoral rays; the humeral spine is coarse and normally ends in 5 points, but in two specimens there are 6-8 points; there are 2-3 teeth on each side of the vomer. In the young the

\* *Lophiomus caulinaris*, Garman, may belong to this genus. Head as broad as long, humeral spine trifid. D. VI, 8; A. 6; P. 17-18. 18 vertebrae.



anterior part of the tongue is white with a network of black lines, which increase in thickness during growth, the adult having pale spots on a dark ground-colour.

### LOPHIUS, Linn.

Teeth in the lower jaw in 3 series anteriorly, in 2 posteriorly; opercular membrane without free posterior margin; gill-openings wide, below the pectorals and extending beyond them posteriorly; pectorals broad, with 23-29 rays, their bases can be received within the gill-openings. Dorsal with VI, 8-12 rays, anal with 8-11, the last ray of each not cleft. Vertebrae 27-32 (? 25-35).

There are certainly four species of this genus, viz., *L. piscatorius*, Linn., *L. litulon*, Jordan, *L. Budegassa*, Spinola, and *L. Vaillanti*, sp. n., and perhaps a fifth, viz. *L. vomerinus*, Cuv. & Val. In all, as in *Lophiomus*, there are a pair of divergent spines on the palatines, and the supraorbital ridge is short and produced into two spines, thus differing from the three species of *Chirolophius* described above, which have three spines on the palatine and an elevated and dentated supraorbital ridge.

#### *Lophius piscatorius*, Linn.

Length of head 2 (young) -  $2\frac{1}{2}$  times in the total length, without caudal. Skeleton fairly well ossified, tissues firm. Humeral spine stout, usually with three points (in one specimen one spine, in another both have two points only), short, its length  $5\frac{1}{2}$ -8 times in the distance from its base to the anterior end of the premaxillaries; eye diameter 7-10 times in this distance; interorbital width  $3-\frac{3}{4}$  times; length of snout  $2\frac{1}{4}$  times. Spines on the head stout, rather blunt. Teeth strong, conical, about 8-11 in the posterior series of fixed teeth on the premaxillaries, 1-3 on each side of the vomer. D. VI, 11-12; A. 10-11; P. 25-28. The rays of the spinous dorsal are rather stout, the first ends in a flap which may be simple or bifid; in one very large specimen the flap is simple, broad, and has its posterior surface entirely white; the second ray is nearly as long as the first. The distance from the tip of the last ray of the soft dorsal, when laid back, to the base of the caudal is not much more than the depth of the caudal peduncle.

Dark brownish slate-colour above, somewhat sharply separated from the white of the lower half of the body. Pectorals blackish above, below white, with a sharply defined black border. Ventrals white, blackish in young specimens.

This description is based upon twelve spirit-specimens and two skeletons in the British Museum. In two of the spirit-specimens I have examined the vertebral column, and I find the number of vertebræ in these and the two skeletons to be 31, 32, 31, and 32 respectively. In each case there are 6 vertebræ posterior to the one below the last dorsal ray. Dr. Gill gives 28 as the number of vertebræ in two specimens examined by him. Cuvier gives the number as 30, and Bonaparte as 28–31. The first vertebra is small, suturally united to the skull, and easily overlooked. Some authors have found only 10 dorsal and 9 anal rays, but it is possible that one or two of the anterior rays have been missed by them.

*Hab.* Coasts of both sides of the North Atlantic, Mediterranean.

*Lophius litulon*, Jordan.

This species is known to me only from very young examples, in one of which I find 27 vertebræ. There are VI 10 (? 9) dorsal and 9 (? 8) anal rays; the pectorals have 23–24 rays. The humeral spine is short and simple. This species is extremely similar to *L. piscatorius*, from which it appears to differ only in the simple humeral spine, the lesser number of fin-rays, and in the greater prominence of the branches of the lateral line on the upper surface of the head, a feature indicated in Dr. Jordan's figure.

*Hab.* Coasts of Middle Japan, ranging farther north than *Lophiomus setigerus* (Jordan).

*Lophius Budegassa*, Spinola.

The British Museum possesses three specimens of this species, which differs from *L. piscatorius* in the following points:—The spines on the head are somewhat longer and sharper in specimens of equal size; the humeral spine is longer, its length being contained  $3\frac{3}{4}$ – $4\frac{1}{4}$  times in the distance from its base to the anterior ends of the premaxillaries (in two specimens the humeral spines have three points, in the third that of one side is simple, of the other bifid); the teeth are slightly shorter, a single tooth on each side of the vomer; the fin-rays are fewer in number, D. VI, 8–9, A. 9, P. 24, and the rays of the spinous dorsal are more slender. The distance from the tip of the last dorsal ray, when laid back, to the base of the caudal is considerably more than the depth of the caudal peduncle. The blackish border of the under

surface of the pectorals is broader and less clearly defined than in *L. piscatorius*. In one specimen I have ascertained the number of vertebræ to be 28, 8 of which are behind the vertebra below the last dorsal ray. Cuvier gives the number as 25, and Bonaparte as 27-30.

*Hab.* Mediterranean.

*Lophius Vaillanti*, sp. n.

Five specimens, the largest 270 mm. in total length, were taken by the 'Talisman' at the Azores and Cape Verde Islands at depths of 460-760 metres; one of these is in the British Museum, the others in the Museum of Natural History at Paris. Professor Vaillant has very kindly looked at these latter, and confirms my opinion that they belong to a species distinct from *L. piscatorius*, differing notably in the feeble ossification of the skeleton, delicacy of the tissues, more elongate body, long slender teeth, bifid humeral spine, larger eye, shorter snout, and slender rays of spinous dorsal—characters which indicate that this fish probably descends to considerable depths. In the single specimen I have examined there are VI, 10 dorsal, 10 anal, and 25 pectoral rays; 14-16 teeth in the posterior series of the premaxillary, and one on each side of the vomer. Owing to the great delicacy of the tissues, there is a large hole torn in the abdomen, which has enabled me to see the anterior part of the vertebral column without further injury to the fish, from which I should judge that the vertebræ may be in somewhat greater number than in *L. piscatorius*. The measurements of this specimen are as follows:—Total length with caudal 266 mm.; length without caudal 216 mm.; length of head 96 mm.; snout 16 mm.; eye diameter 12 mm.; interorbital width 15 mm.; humeral spine 14 mm.; length of rays of spinous dorsal, I 35 mm., II 31 mm., III 24 mm., IV 23 mm., V?, VI?.

Colour pale brown; dorsal, caudal, and pectorals blackish.

*Lophius vomerinus*, Cuv. & Val.

This species is founded on a single specimen from the Cape of Good Hope, 660 mm. long. It is said to have no teeth on the vomer, on which account M. Guichenot regards it as the type of a separate genus (*Lophiopsis*). The number of rays, D. VI, 10, A. 9, P. 26, points to the probability that it belongs to this genus, but it cannot yet be certainly regarded as a distinct species.

XXXV.—*Two new Glossophagine Bats from Central America.* By OLDFIELD THOMAS.

THE British Museum has recently received from Mr. C. F. Underwood three specimens of a new Glossophagine bat which, although nearly related to *Chæronycteris*, cannot be referred to that genus, but requires a new one for its reception. In working it out I have also found a *Chæronycteris* in the Museum collection to need description.

*HYLONYCTERIS*, gen. nov.

External characters as in *Chæronycteris*, the nose-leaf, ears, index-finger, interfemoral membrane, and tail all as in that genus.

Dental formula :—

$$I. \frac{2}{0}, C. \frac{1}{1}, P. \frac{2}{3}, M. \frac{3}{3} \times 2 = 30.$$

Upper incisors very small, in a curved row, nearly equally spaced, the outer pair inappreciably larger than the inner. No trace of lower incisors. Canines, premolars, and molars as in *Chæronycteris*, but there is no wide space behind the upper canine, where the "deciduous" anterior premolar might have stood. (I have never seen a case of its persistence in *Chæronycteris*, but there is always a wide space for it, and it is treated as present in all the published dental formulæ.)

Skull of medium proportions, the muzzle neither so developed as in *Chæronycteris mexicana* nor so reduced as in the species next to be described. Zygomata absent. Bony palate elongate, the posterior nares level with the middle of the glenoid surfaces. Pterygoid processes normal, not inflated or produced backwards to reach the auditory bullæ. Basis-occipital deeply excavated on each side of a strong median ridge, the latter continuous with a marked median vomerine ridge.

Type, *Hylonycteris Underwoodi*, sp. n.

This bat is evidently very closely allied to *Chæronycteris*, but the different structure of its pterygoid and sphenoid regions and the permanent absence of the anterior premolar appear to prevent its being definitely assigned to that genus. In this conclusion I have been confirmed by a study of the characters of *C. Godmani*, described below, which, at first sight appearing far more distinct from *Chæronycteris mexicana* than does *Hylonycteris Underwoodi*, shows the same essential structure of the base of the skull and the same marked diastema behind the upper canines.



*Hylonycteris Underwoodi*, sp. n.

Size about as in *Chæronycteris minor*. Muzzle of medium length, not so conspicuously whiskered as in *C. mexicana*. Nose-leaf small, narrow, pointed, without distinct midrib. Ears fairly large, their inner margin evenly convex, tip rounded; outer margin slightly concave above, then convex, a much sharper and deeper notch than in *Chæronycteris* separating the pointed antitragal part below. Wings attached to the ankles. Interfemoral membrane well developed, the tip of the short tail appearing in the middle of its upper surface. Calcar shorter than the foot. Feet short, the claws apparently bearing a greater proportion to their length than usual.

Fur practically confined to the body and the fleshy part of the forearms and hind legs, not extending on to the wings or interfemoral membranes.

Colour dark brown (seal-brown) above, the crown of the head almost black, below very slightly paler. Individually the hairs of the back are tricolor, darker brown basally and terminally, with a whitish-brown mesial ring.

Skull with the muzzle of medium proportions, but the palate is not so parallel-sided as in *Chæronycteris*, the two rows of teeth diverging considerably behind. Teeth generally similar in form to those of *Chæronycteris*, but rather shorter horizontally, and therefore less highly specialized than in that animal.

Dimensions of the type:—

Forearm 34·5 millim.

Skull: greatest length 23; basal length 20·3; interorbital breadth 4·2; breadth across brain-case 8·6; tip of muzzle to just behind anterior zygoma-root 9·8; length of palate 14·2; front of canine to back of  $m^3$  8·5, ditto below to back of  $m_3$  8·8.

Dimensions of a skin, softened and put in spirit:—

Forearm 32·5.

Nose-leaf, length 5·3; ear 11·5; thumb (c. u.) 10; index 32; third finger, metacarpus 33·5, first phalanx 14, second phalanx 18·5; fifth finger, metacarpus 29, first phalanx 7·3, second phalanx 11; lower leg 12; hind foot, s. u. 7, c. u. 9·8; calcar 6; tail 6; depth of interfemoral in centre 13.

*Hab.* Rancho Redondo, Costa Rica (type). Two other specimens from Tarbaca, Costa Rica.

*Type.* B.M. no. 3. 2. 1. 5. Collected 30th June, 1899, by C. F. Underwood. Three specimens.

This forms the second new genus of bats that Mr. Underwood has discovered, the first having been *Glyphonycteris*, described by me in 1896.

In studying this bat the following species also proves to need description:—

*Chæronycteris Godmani*, sp. n.

Size, as judged by forearm, about as in *C. minor*, but owing to the great reduction of the muzzle the skull is conspicuously smaller. Snout less heavily whiskered than in *C. mexicana*. Face small and pointed, very different to the long face of the other species. Nose-leaf triangular, about as broad below as high. Ears in shape and proportionate size about as in *C. mexicana*, but, owing to the shorter face, they reach when laid forward to the eye; antitragal lobe low, rounded, the notch behind it shallow. Calcar fairly long, reaching when laid against the foot to the middle of the claws.

Fur short and close, confined to the body and the fleshy parts of the forearms and thighs. Its colour (in spirit) appears to be a dull uniform brown above and below.

Skull differing conspicuously from that of the other species of the genus by its disproportionally small, delicate, and slender muzzle, the brain-case being nearly equal to that of *C. minor*, while the muzzle is not two thirds its size in that species. The measurements of the palate and tooth-rows given below afford evidence of this characteristic. Hinder edge of palate level with middle of glenoid surface. Pterygoid processes bulbous and reaching backwards, as in *C. mexicana* and *minor*, to the bullæ. Basioccipital excavated laterally, but the median ridge is not continued forward on to the sphenoid, which is quite flat. Ramus of lower jaw very slender, its vertical height behind  $p_1$  about 0·8 millim. Teeth very delicate, with wide gaps between them, their shapes as in *C. minor*; a large vacant space behind the upper canines. Upper incisors subequal, in pairs, widely separated in the middle line.

Dimensions of the type, measured on the spirit-specimen:—

Forearm 33·5 millim.

Head and body 47; tail 7; nose-leaf  $3\cdot5 \times 3\cdot0$ ; ear 9·5; third finger, metacarpus 32, first phalanx 13, second phalanx 17; fifth finger, metacarpus 28, first phalanx 8, second phalanx 9·3; lower leg and foot, s. u. 18·5, c. u. 19·8; calcar 6·3; depth of interfemoral in middle line 12·5.

Skull: greatest length 19·6, basal length 17; breadth across brain-case 8; breadth of muzzle at anterior premolar 8;

tip of muzzle to supraorbital foramen 7·5; palate length 12; breadth between outer corners of  $m^3$  4; front of canine to back of  $m^3$  7·1.

*Hab.* Guatemala.

*Type.* Adult male in spirit. B.M. no. 79. 12. 24. 1. Collected by Mr. G. C. Champion and presented by F. DuCane Godman, Esq., in whose honour I have named it.

This bat was on arrival determined as *C. minor* by Dobson, but not only does its skull differ conspicuously from that referred by the same author in his Catalogue to Peters's species, but in the original description no mention is made of the proportions of the head or skull being in any way different from those of the typical species *C. mexicana*. In fact, the head-length of *C. minor* (26 millim.) is alone sufficient to prove the distinctness of the two forms.

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XXXVI.—*Note on the Technical Name of the Tasmanian Devil.* By OLDFIELD THOMAS.

THE current name for this animal, *Sarcophilus ursinus*, is based on the *Didelphys ursina* of Harris (Tr. Linn. Soc. ix. p. 176, 1808), but not of Shaw (Gen. Zool. i. pt. 2, p. 504, 1800), which is the Tasmanian wombat. On the principle of "once a synonym always a synonym," the name *ursinus* is not available for the animal to which it was applied at the later date, and a new name will therefore be required for the Tasmanian Devil.

I would suggest for it that of *Sarcophilus satanicus*.

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XXXVII.—*A new Duiker from West Africa.*  
By OLDFIELD THOMAS.

THE British Museum owes to Sir Douglas Brooke, Bart., the gift of three specimens—adult male, female, and young—of a Duiker from Fanti, from the collection of his father Sir Victor Brooke. These have hitherto been regarded as *Cephalophus Ogilbyi*; but an opportunity having occurred of examining a fresh skin and skull of the latter animal, brought home by Capt. Boyd Alexander from Fernando Po, I find that the mainland form is distinct from that of the island. In

memory of the well-known authority on the Ungulata, Sir Victor Brooke, from whose collection the specimens come, I have very great pleasure in naming it

*Cephalophus Brookei*, sp. n.

Size slightly less than in *C. Ogilbyi*. General colour very much as shown in the figure of that animal in the 'Book of Antelopes' (pl. xviii. fig. 2); in fact, I am convinced that that figure, which was one of those prepared under Sir V. Brooke's own directions, was taken from this animal. The supraorbital dark and light lines are, however, too strongly marked, and the legs are too dark, these being uniformly light to the hoofs in *C. Brookei*, while in *C. Ogilbyi* the phalanges and front of the metapodials are black. Hairs of middle line of nape reversed forwards for 3 or 4 inches, as in *C. Weynsi* and *Johnstoni*. Dorsal stripe deep black, much broader than in *C. Ogilbyi*, about 2-2½ inches broad at its widest point, not continued on to the tail, but terminating 3 or 4 inches short of the root of that organ, which has, however, in the young specimen only, a renewed dark line on its upperside. Tail with a grizzled black-and-white terminal tuft.

The young specimen is in many respects darker than the adults, having a black frontal patch, brown fore-quarters, and dark limbs; but the characteristic appearance of the dorsal streak induces me to consider that it is probably associated rightly with them.

Skull, as compared with that of *C. Ogilbyi*, rather smaller, narrower across the orbital region, and without the marked frontal convexity found in that species; muzzle parallel-sided, the nasals less broadened posteriorly; premaxillæ broadly articulating with sides of nasals; anteorbital pits shallow; median notch of palate broadly rounded, approximately level with the lateral ones; bullæ variable, those of the male very much smaller than those of the female.

Horns considerably smaller than those of *C. Ogilbyi*, lying back in or below the general line of the face; those of the male 73 millim. long, with a basal diameter of 26 millim., these measurements being in the female 40 and 20.

Dimensions of the type (stuffed):—

Head and body 900 millim.; tail 120; hind foot (s. u.) 195; ear 88. Height at withers 500.

Skull: basal length (c.) 172; greatest breadth 84; muzzle to orbit 103; nasals 86 × 39; interorbital breadth 46; muzzle



to alveolus of  $p^2$  71; palate length 110; length of upper tooth-row 56.

*Hab.* Fanti.

*Type.* Adult male. B.M. no. 97. 1. 5. 2. Collected by Aubinn, acquired by Sir Victor Brooke, and presented by the latter's son, Sir Douglas Brooke.

This distinct species, the mainland representative of *C. Ogilbyi*, is readily distinguishable from that animal by the reversed hairs of the nape, the much broader dorsal streak, which does not run on to the tail, the light-coloured feet, and by the less swollen frontal region of its skull.

It is still possible that *C. Ogilbyi* may occur on the mainland, but these Fanti specimens are certainly not referable to it.

XXXVIII.—On Three new Races of *Tragulus kanchil*,  
*Raffles, with Remarks on the Genus.* By J. LEWIS  
BONHOTE, M.A.

A FEW months ago Messrs. Stone and Rehn published a paper on some mammals from Sumatra\*, and included in it a revision of the genus *Tragulus*.

With their findings as a whole I quite agree, and, having had occasion lately to look up the genus, I find that we have in the British Museum three apparently undescribed forms of the smaller Chevrotain from Borneo, Bunguran Island, and Cochin China, which I propose to describe.

Before doing so, however, it may perhaps be as well to make a few remarks on the whole genus.

Many naturalists cavil greatly at the mass of names that is slowly but surely rising round each group, which they would call a single species, and thereby refuse to recognize geographical forms. Now these races, which arise from their geographical position, represent no doubt the initial differentiations of new species, and, far from being ignored, should be most closely studied. The easiest and simplest method of doing so is to describe them and recognize them by means of trinomials.

I cannot agree with those who, while using trinomials for continental races, refuse to allow them for insular races, on

\* Proc. Acad. Nat. Sci. Philad. p. 127 (1902).

the plea that, as intermediate forms do not exist, they must be regarded as separate species.

The present genus offers a very good example of the confusion that may arise from adhering to binomials for insular races.

Messrs. Stone and Rehn, omitting all Mr. Miller's late species, give a list, excluding synonyms, of eight species, with nothing to show that some are much more closely related than others.

If Mr. Miller's recent forms be taken into account, we find the number of species doubled, and this mass of names, if not connected in groups as indicated by trinomials, can only lead to confusion rather than to a clearer understanding of the genus.

If the subject be carefully studied, we find that there are only four, or, at the most, five species, viz., *T. meminna*, *T. Stanleyanus*, *T. javanicus* (Osbeck, nec Gm.) (the *T. napu* of authors), *T. kanchil*, Raffles (the *T. javanicus* (Gm.) of authors), and possibly *T. fulviverter*. Of the first two species but little is known, while *T. javanicus* and *T. kanchil* are represented by a slightly different form on almost all the islands of their range.

With regard to *T. fulviverter*, externally it much resembles some of the forms of *T. kanchil*, but there are certain cranial differences which would seem to point to its being a distinct species. If its true habitat be Malacca, as is stated by Gray, it must, of course, be regarded as distinct; but from its general appearance I suspect its real home is to the east either on the mainland or one of the islands, in which case it can only be considered a race of *T. kanchil*.

The differences between *T. kanchil* from Sumatra and *T. kanchil pelandoc* from Java, as stated in the paper quoted above, do not appear to hold good in all cases. In two specimens from Java which I have examined one resembles *pelandoc* on the throat and *kanchil* on the nape, while the other has the nape of *pelandoc* and throat of *kanchil*, so that further evidence is required as to the distinctions between these forms.

Messrs. Stone and Rehn appear to have overlooked a species described by Gray under the name of *Tragulus affinis* (P. Z. S. 1861, p. 138). Gray, in his description, states that it is a pale-coloured variety much resembling those from Cochin China, and that it is supposed to have come from Singapore. Under these circumstances Mr. Miller was quite justified in describing the form found in the Malay Peninsula as new.

Gray's type, however, is in the British Museum, and a comparison with specimens from the Peninsula shows that it agrees with them exactly, but does not agree with the specimen from Cochin China described in this paper.

Under these circumstances, therefore, Mr. Miller's name of *ravus* has to give place to Gray's name, and the small chevrotain from the Peninsula should be known as *T. kanchil affinis*.

The following belong to apparently undescribed races of *T. kanchil*:—

*Tragulus kanchil Pierrei*, subsp. n.

Size as in *Trag. kanchil affinis*, Gray.

General colour throughout very uniform and of a dull yellowish brown, slightly darker on the back, the general tone being between "wood-brown and tawny olive"\* , shading in the darker portions to "mummy-brown"\* . The under-part of the chin and throat (except for the usual markings), the chest, and the inner sides of all four limbs are white. The belly is pale ochreous and the markings on the throat, which form a complete triangle, brownish clay.

The skull does not appreciably differ from that of *T. k. affinis* of the Peninsula, except in being a trifle more stoutly built. The nasals are narrower and the bullæ somewhat broader, *i. e.* projecting farther downwards. The basioccipital is more constricted and its downward processes much more marked.

Dimensions (from skin):—Head and body 420 millim.; tail 57; tarsus 81.

*Skull*.—Greatest length 89 millim.; basal length 76; palatal length 57; length of nasals 25; maxillary tooth-row 32; zygomatic breadth 42; length of bullæ 17; greatest breadth of bullæ 7.5.

*Hab.* Bien Hoa, Lower Cochin China.

*Type.* B.M. 78. 6. 17. 18. Collected by M. Pierre, February 1877.

The very brownish colour of this animal and absence of any black serve to distinguish it from all other forms. It is most nearly related to *T. k. affinis*, Gray.

*Tragulus kanchil Hosei*, subsp. n.

A brightly coloured *Tragulus* slightly larger than *T. k. affinis*.

\* These are the names given in Ridgway's 'Nomen. of Colours.'

General colour on the back black, strongly grizzled with rufous, which latter colour predominates, but is slightly yellower in tint on the sides. Head and face as the back, lighter on the cheeks. Nape-stripe very well defined and nearly pure black. Sides of neck and fore feet rufous, hind feet similar in colour to the back. Well-defined orange markings start from inside the fore legs and run backwards and inwards to join in the middle line, thence passing backwards along the median line to the vent, where it widens out into a broad irregular transverse band. There is a further narrow line of this colour bordering the colour of the upper parts and bordering both sides of the white on the inner side of the thighs. The median ventral stripe is also carried forward to meet the transverse stripe on the neck. The markings on the neck are of the usual shape and are orange-rufous thickly grizzled with black. The remainder of the underparts are pure white. The tail, which is longer than in *T. k. affinis*, is similar in colour to the rest of the body, viz., grizzled rufous above and white below.

The *skull* is similar but larger than that of *T. k. affinis*, the most noticeable point of difference being in the bullæ, which are very much swollen and rounded and nearly twice as large; as a result of this the constriction of the anterior portion of the basioccipital, noticed when dealing with the last species, has gone a stage further and become still more constricted, so that the whole bone is rather wedge-shaped, with the sharp edge downwards, leaving a fairly deep groove on either side between the wedge and the bullæ. Another point of difference is in the anterior margin of the præmaxillæ, which bends abruptly downwards from the anterior end of the nasals, whereas in *T. k. affinis* and *T. k. Pierrei* it goes down in a more gradual slope.

Dimensions (of type) from dried skin:—Head and body 472 millim.; tail 75; hind tarsus 98.

*Skull*.—Greatest length 98 millim.; basal length 86; palate length 62; length of nasals 29; zygomatic breadth 42; length of maxillary tooth-row 32; length of bullæ 20; greatest breadth of bullæ 10.

*Hab.* Baram River, Sarawak.

*Type.* Adult female. B.M. 0. 8. 4. 10. Collected and presented by Mr. C. Hose.

This handsome race is most nearly allied to *T. fulviventer*, from which it differs chiefly in its larger size and rather paler coloration. *T. fulviventer* has, in addition, a clear orange transverse band on the throat connecting the apex of the triangle with the colour of the upper parts on either side,



while it lacks the irregular transverse band across the vent. I am doubtful if there is any specific value attaching to these markings of the underparts, but perhaps it is as well that they should be noted.

If we turn to the skull we find that *T. fulviventer* is intermediate in form between *T. affinis* and the present subspecies. It is intermediate in size, intermediate in the constriction of the basioccipital, and intermediate in the amount of swelling undergone by the bullæ. The præmaxillæ, however, are of the *T. Hosei* type. The maxillary tooth-row is precisely the same length in all three forms, and in the case of *T. affinis* and *T. Hosei* the teeth are practically alike, but in *T. fulviventer* there is a curious change, which I take to be merely an individual variation. The second molar in the upper jaw on either side is considerably broader, measuring 7 millim., as against 5 millim. in *T. Hosei*, and the last molar is reduced to a single conical cusp.

*Tragulus kanchil Everetti*, subsp. n.

Appearance similar to *T. k. Hosei*, but deeper in colour and rather smaller.

General colour like *T. k. Hosei*, except that the red on the flanks is much deeper, being rufous ("ochraceous rufous," Ridgw.) instead of deep buff ("orange-rufous," Ridgw.).

Underparts pure white, with the exception of one long median ventral stripe, broad and of an orange colour over the belly, but narrow and grizzled anteriorly. There is a very faint trace of the transverse abdominal band, and a patch of orange on the thighs narrows down the white to a thin stripe.

The skull, which is slightly smaller than that of *T. k. Hosei*, may be at once distinguished by its large teeth and small bullæ. The præmaxillæ, instead of sloping gradually downwards after leaving the nasals, as in *T. affinis*, or narrowing abruptly, as in *T. Hosei*, continue forwards at their original breadth for some 3 millim., and then suddenly turn down abruptly. In other respects the skull does not differ from that of *T. k. Hosei*.

Dimensions (of type) from dried skin:—Head and body 450 millim.; tail 73; hind tarsus 89.

*Skull*.—Basal length 83 millim.; palatal length 60; length of nasals 29; length of maxillary tooth-row 35; zygomatic breadth 44; length of bullæ 16; breadth of bullæ 7.

*Hab.* Bunguran Island, Natunas.

*Type*. Adult female. B.M. 94. 9. 28. 21. Collected on the 1st October, 1893, by Mr. A. H. Everett.

Externally the bright colour of this race is sufficient to distinguish it at a glance. As regards cranial characters, the large teeth and small bullæ are such conspicuous and readily seen features as to enable it to be very easily identified, while at the same time forming characters which leave no doubt in my mind that the island race is a good and well-marked form.

I append a list of the hitherto described species, with references to the original descriptions and the localities in which they were obtained:—

1. *Tragulus meminna*, Erxl. Syst. Regn. An. p. 322 (1777).  
—Ceylon and S. India.
2. *Tragulus Stanleyanus*, Gray, P. Z. S. 1836, p. 65.—*Loc.*  
Unknown.
3. *Tragulus javanicus* (Osbeck, nec Gm.) (*T. napu* of authors).  
*Cervus javanicus*, Osbeck, Reise nach Ostindien und China, p. 357 (1765).—Java.  
*Tragulus javanicus napu* (F. Cuv.), Hist. Nat. Mamm. pl. cccxxix. (1822).—Sumatra.  
*T. j. nigricans*, Thos. Ann. & Mag. Nat. Hist. ser. 6, vol. ix. p. 254 (1892).—Philippines.  
*T. j. rufulus*, Miller, Proc. Wash. Acad. Sci. ii. p. 227 (1900).—Tioman Island.  
*T. j. canescens*, Miller, Proc. Biol. Soc. Wash. xiii. p. 185 (1900).—Tury, L. Siam.  
*T. j. umbrinus*, Miller, Proc. Biol. Soc. Wash. xiii. p. 191 (1900).—Pulo Lankawi.  
*T. j. bunguranensis*, Miller, Proc. Wash. Acad. Sci. iii. p. 113 (1901).—Bunguran Island.  
*T. j. pretiosus*, Miller, Proc. Acad. Nat. Sci. Philad. p. 144 (1902).—Linga Island.  
*T. j. borneanus*, Miller, Proc. Biol. Soc. Wash. xv. p. 174 (1902).—British North Borneo.
4. *Tragulus kanchil*, Raffles (*T. javanicus* (Gm.) of authors).  
*Tragulus kanchil*, Raffles, Trans. Linn. Soc. xiii. p. 262 (1822).—Sumatra.  
*T. k. pelandoc*, Ham. Smith, Griff. Anim. Kingd. iv. p. 66 (1827).—Java.  
*T. k. fulviventris*, Gray, P. Z. S. 1836, p. 65.—Malay Peninsula?  
*T. k. affinis*, Gray, P. Z. S. 1861, p. 133.—Singapore.  
*T. k. pallidus*, Miller, Proc. Wash. Acad. Sci. iii. p. 116 (1901).—Pulo Laut.  
*T. k. Pierrei*, mihi.—Lower Cochin China.  
*T. k. Hosei*, mihi.—Baram River, Sarawak.  
*T. k. Everetti*, mihi.—Bunguran Island.

XXXIX.—*Description of a new Species of Balanus from the Collection of the British Museum.* By Prof. A. GRUVEL.

*Balanus violaceus*, sp. n.

*Diagnosis.*—Walls and base porous. Radii well developed, not pierced by pores. Test violaceous in general colour, with numerous narrow, longitudinal, clear grey-blue ribs. Base entirely porous. Scuta with the articular ridge very prominent, the ridge of the adductor feebly developed and situated a little nearer the rostral than the tergal margin; pit for the adductor muscle deep; cavity for the lateral depressor muscle also deep. Terga with the ridge and the articular furrow very clearly marked; spur prominent at the rounded lower extremity, and situated at a slightly less distance than its own width from the basiscutal angle; crests for the depressor muscle very distinct and prominent; no external longitudinal furrow, but, on the contrary, a longitudinal ridge; apex slightly projecting, terminating in a blunt point.

*Habitat.* Unknown.

N.B.—This species comes near to *B. nubilus*, Darwin, and consequently its place is in section C.

XL.—*On the Genera of the Dromiidae.* By L. A. BORRADAILE, M.A., Lecturer in Natural Sciences at Selwyn College, Cambridge.

SINCE Bouvier's paper "Sur l'Origine homarienne des Crabes" (Bull. Soc. Philom. 1896) the limits of the genera of this family of primitive crabs have become very uncertain. In the list of genera and species of the Dromiacea which he has lately published \* Alcock has included Stimpson's *Dromidia*, with *Dromia* as a subgenus, and placed *Dromidiopsis* † with *Dromidia* as synonymous, regarding *Cryptodromia*, Stimps., as still an independent genus. In working out the collection of Dromiidae made by the late Maldivé Expedition I have been led to conclusions which differ from these with regard to the genera *Dromidia* and *Dromidiopsis* and support the view hitherto held of their generic distinctness. Moreover, it has seemed that certain other rearrangements are

\* 'Catalogue of the Indian Decapod Crustacea in the Collection of the Indian Museum,' part i. fascic. 1, pp. 74-80 (1901).

† Borradaile, P. Z. S. 1900, p. 572.

necessary and that a new genus must be established for one of the new Maldivian species. In these circumstances a settlement of the question may be forwarded by the following short survey of its position, in the shape of a redefinition of the central group of genera and a key which includes them with the others of the family.

The definition of each of the revised genera is followed by a list of those species which I am at present able to assign to it. References to all of these which have been already described will be found in Alcock's work cited in the footnote. The new species will be described in the 'Fauna and Geography of the Maldivian Islands,' vol. ii. part 1.

The features of which I have made use for systematic purposes are for the most part those taken by other writers. The principal are:—The presence or absence of an epipodite on the first leg (cheliped), the distinctness or otherwise of the furrows on the back which mark off the regions, the proportion of the length of the carapace in the middle line to its greatest breadth, the shape of the legs, and the arrangement of the sternal furrows. These are a pair of grooves, one on each side, which run fore and aft over the thoracic sternites of the female, beginning on the hindmost and ending on that which corresponds to the first, second, or third pair of legs. Their forward ends may be raised on knobs, and are either wide apart, side by side but not meeting, or curving to meet.

### *Definitions of Genera of Dromiidae.*

#### 1. DROMIA, Fabr.

"Dromiidae with an epipodite on the cheliped, the walking-legs not knobbed or ridged, the carapace broader than long, the regions well marked or indistinct, the ridges of the efferent branchial channels broken, indistinct, or well made, the sternal grooves of the female ending apart behind the cheliped segment, the fifth leg shorter than the third and with no thorn on the outer side of its last joint."

*D. vulgaris*, *D. dormia* (= *D. Rumphii*), &c.

#### 2. DROMIDIOPSIS, Borradaile.

"Dromiidae with an epipodite on the cheliped, the walking-legs not knobbed or ridged, the carapace longer than broad, the furrows between the regions almost completely lost, the ridges of the efferent branchial channels well made, the sternal grooves of the female ending together on the cheliped segment or on that of the first walking-leg, the fifth leg



about as long as the third and often with a thorn on the outer side of its last joint."

*D. australiensis*, *D. tridentatus*, sp. n., *D. cranioides*, *D. orientalis*, ? *D. caput-mortuum*, &c.

### 3. DROMIDIA, Stimps. (? + *Pseudodromia*, Stimps.).

"Dromiidae with no epipodite on the cheliped, the walking-legs not knobbed or ridged, the carapace narrow but not longer than broad, the furrows between the regions almost completely lost, the ridges of the efferent branchial channels well made, the sternal grooves of the female ending together usually on the segment of the cheliped, the fifth leg longer than the fourth, as long as or rather shorter than the third, and with no thorn on the outer side of its last joint."

*D. hirtissima* (probably), *D. antillensis*, *D. unidentata*, &c.\*

### 4. DROMIDES, gen. nov.

"Dromiidae with no epipodite on the cheliped, the walking-legs not knobbed or ridged, the carapace longer than broad, the furrows between the regions almost completely lost, the ridges of the efferent branchial channels well made, the sternal grooves of the female ending apart in the fore part of the segment of the second walking-leg, the fifth leg shorter than the third and with no thorn on the outer side of its last joint."

*D. Hilgendorfi*, &c.

### 5. CRYPTODROMIA, Stimps. (+ *Epidromia*, Kossm.).

"Dromiidae with no epipodite on the cheliped, the walking-legs knobbed or ridged, the carapace usually broader than long, the regions present and usually well defined, the ridges of the efferent branchial channels well made, the sternal grooves of the female ending apart behind the cheliped segment, the fifth leg shorter than the third, and its last joint without a thorn on the outer side."

*C. coronata* (probably), *C. pileifera*, *C. canaliculata*, *C. bullifera*, *C. Demani*, *C. ebaloides*, *C. Gilesi*, *C. granulata*, *C. hirsuta*, sp. n., &c.

### 6. CRYPTODROMIOPSIS, gen. nov.

"Dromiidae with no epipodite on the cheliped, the walking-legs knobbed or ridged, the carapace broader than long,

\* The species known as *Dromidia globosa* (Lam.) seems to me to belong to *Cryptodromia*. The question can only be settled by an examination of the sternal grooves of the female, which appears to be unknown.

especially broad in the forepart, and with the furrows between the regions almost completely lost, the ridges of the efferent branchial channels well made, the sternal grooves of the female ending together on the cheliped segment, the fifth leg shorter than the third, and a spine on the outer side of its last joint."

*C. tridens*, sp. n., &c.

#### 7. PETALOMERA, Stimps.

"Dromiidæ with an epipodite on the cheliped, the walking-legs bearing sharp ridges, the carapace varying in the relation of its length to its breadth, but usually broader than long, the regions clearly or indistinctly marked, the efferent branchial channels well made, the sternal grooves of the female ending apart behind the cheliped segment, the fifth leg shorter than the third, and without a thorn on the outer side of its last joint."

*P. granulata*, *P. pulchra*, *P. indica*, *P. lateralis*\*, &c.

It is as yet impossible to assign most of the species hitherto placed under *Dromia*, *Dromidia*, and *Cryptodromia* to any of the genera above defined, owing to lack of knowledge, especially with regard to the epipodites and sternal grooves. Making use of such information, direct or implied, as can be found in the works of former writers on the subject, as well as that given by my own examination of a number of specimens, I have placed all the species I could. Till further details be forthcoming it will probably be found convenient to keep the others where Alcock has placed them. No doubt later knowledge will also make it needful to drop several items in the diagnoses, so as to give room for species which clearly belong to some particular genus but infringe its definition in certain respects. Alteration may also have to be made in the naming of the two genera which I have called *Dromidia* and *Cryptodromia*. With regard to the type species which carry these names—*D. hirtissima* (Lam.) and *C. coronata*, Stimps.,—we are as yet in ignorance on the all-important question of the epipodites. It seems likely, however, from their other features that they resemble in this respect the species with which I have placed them.

\* *Cryptodromia lateralis* has epipodites on the chelipeds. There is also a distinct tendency to the formation of sharp ridges on the walking-legs. I am inclined to think that this species should be placed between the immediate ancestor from which *Cryptodromia* and *Petalomera* arose and *Dromia* (see tree on p. 302). In any case, the epipodites forbid its being placed in *Cryptodromia*, and its differences from the species of *Petalomera* as originally defined do not seem generic.

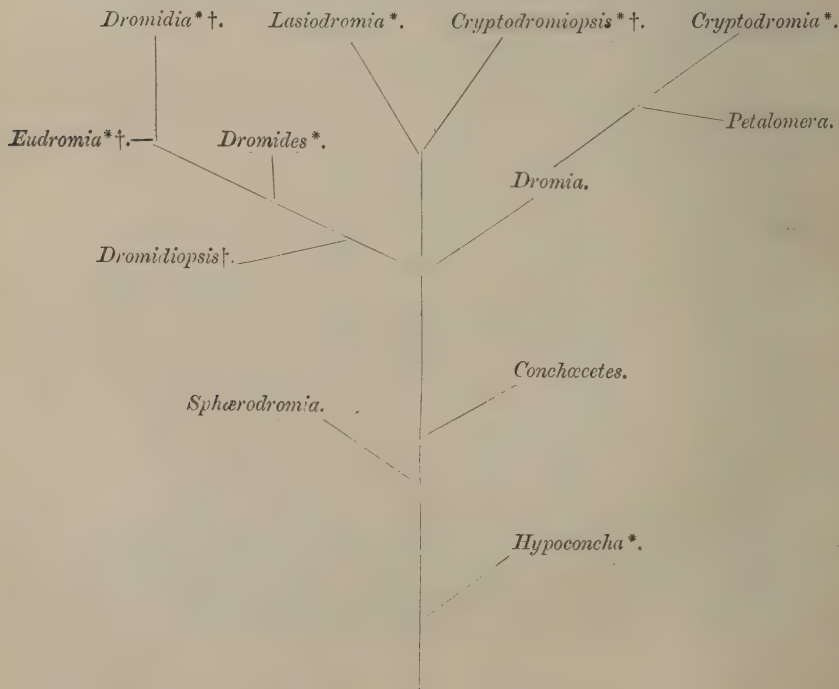
The following key sets forth, in a more or less empirical way, the principal characters of the genera of Dromiidae \*:—

- I. No vestige of the sixth abdominal limb.  
Last joint in legs of hinder two pairs has the shape of a half-moon, fastened by its outer side to the end of the leg. [No epipodite on the cheliped. Sternal grooves end apart on segment of second walking-leg. Carapace incompletely and more or less indistinctly divided into regions.] . . . *Hypoconcha*, Guér., 1854.
- II. A vestige of the sixth abdominal limb.  
Last joint in legs of hinder two pairs has the shape of a hook, fastened at the blunt end to the leg.
  - A. Sternal grooves not reaching level of genital opening. Front triangular, notched in the middle. [Carapace subglobose, without regional grooves in the fore part. Epipodites?] . . . . . *Sphaerodromia*, Alc., 1899.
  - B. Sternal grooves reaching level of genital opening. Front usually with a middle tooth and one on each side.
    - i. Fourth pair of legs shorter than third, but stout and ending in a very large hooked joint. Carapace flat. [Fifth leg slender. Epipodite on cheliped. Sternal grooves end apart.] . . . . . *Conchæcetes*, Stimps., [1859.
    - ii. Fourth pair of legs not as in *Conchæcetes*. Carapace more or less swollen.
      - a. Front deeply cleft into two bifid lobes. [No epipodite on cheliped. Sternal grooves end apart on cheliped-segment.] . . . . . *Lasiodromia*, Alc., 1901.
      - b. Front not as in *Lasiodromia*.
        1. Epipodites on the chelipeds.
          - a. Sternal grooves end together. Carapace longer than broad. Almost without regions. Usually a thorn on the outer side of the last joint of the fifth leg . . . . . *Dromidiopsis*, Borradaile, [1900.
          - β. Sternal grooves end apart. Carapace usually broader than long. Regions more or less clearly marked. \* No thorn on the outer side of the last joint of the fifth leg.
            - (1) No ridges on the legs. Carapace not granular . . . . . *Dromia*, Fabr., 1798.
            - (2) Ridges on the legs, some of

\* For lack of information I am unable to include *Pseudodromia*, Stimps., 1859 (Proc. Ac. Philad. 1858, p. 226), or *Platydrobia*, Fulton and Grant, 1902 (Proc. Roy. Soc. Victoria, 1902, p. 55). The first of these genera seems to be closely allied to *Dromidia*, and the second should perhaps be placed somewhere in the neighbourhood of *Cryptodromiopsis*.

- which are sharp. Carapace more or less granular .... *Petalomera*, Stimps., 1859.
2. No epipodites on the chelipeds.
- a. Legs knobbed or ridged. Carapace broader than long.
- (1) Regions more or less clearly marked. Sternal grooves end apart. No thorn on hinder edge of last joint of fifth leg ..... *Cryptodromia*, Stimps., 1859 (+ *Epidromia*, Kossm.).
- (2) Regions almost lost. Sternal grooves end together. A thorn on the hinder edge of the last joint of the fifth leg ..... *Cryptodromiopsis*, g. n.
- β. Legs not knobbed or ridged. Carapace narrow, often longer than broad. [Furrows between the regions almost absolutely lost.]
- (1) Sternal grooves end together.
- (a) Front deeply cleft into two prominent rounded lobes. *Eudromia*, Hend., 1888.
- (b) Front not as in *Eudromia*. *Dromidia*, Stimps., 1859.
- (2) Sternal grooves end apart .. *Dromides*, g. n.

The probable genealogical relations between the genera may be represented by the following tree:—





In view of the great complexity of the subject and the small amount of information as yet available on several important points, it will easily be understood that the above arrangement only professes to be tentative\*. It is given here not alone for its own interest, but because it shows very clearly a phenomenon often to be met with in the attempt to deal with problems of this kind. The group of genera on the right-hand branch have broad, usually well-regioned bodies†, and legs which are knobbed and ridged (except the walking-legs of *Dromia*). Those on the left-hand branch have simple legs and narrow bodies, almost without trace of regions. Now, the names followed by a star are those of genera which have lost the epipodites of their chelipeds, and it is easy to see that a division made on this feature would cross that made on the shape of the body and legs. Again, the genera after whose names a dagger stands are those in which the sternal grooves end together, so that by these grooves a third separation could be made. And, to take one more criterion, a thorn appears on the outer side of the last joint of the fifth leg in genera which, on other grounds, are separated as widely as *Dromidiopsis* and *Cryptodromiopsis*. Indeed, the whole tree is a good example of that kaleidoscopic shuffling of characters which so often meets the student of zoological genealogy, and whose interest lies in the suggestion that it makes of a tendency in the organization of the animals in which it is found to fall into certain types of structure somewhat reminiscent of the discontinuous variation of the Neo-Mendelians.

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XLI.—On the Affinities and Nomenclature of certain Genera of Melolonthid and Rutelid Coleoptera. By GILBERT J. ARROW.

IN Gemminger and Harold's Catalogue of the Coleoptera the genus *Stethaspis* (in the Melolonthidæ) is represented by the single species *suturalis*, Fabr., of which *Micronyx chlorophyllus*, Boisd., and *Paranonca prasina*, Cast., figure as synonyms. Lacordaire expressed himself very doubtful of the correctness of the latter identification, and in 1873 *Paranonca* was referred by Lansberge to its right position with the

\* This is especially the case with *Lasiodromia*, *Cryptodromiopsis*, and *Dromides*, whose position is extremely doubtful.

† With some exceptions it may be said that species belonging to genera on the right half of the diagram are broad, those on the left long.

Australian Rutelidæ. Recently Mr. F. Bates has called my attention to the fact that this genus is not really distinguishable from *Schizognathus* as at present constituted; but the nearest ally of Castelnau's species cannot be exactly determined from the curious fact that, although it does not appear to be rare, the male is not yet known. In all the species at present referred to *Schizognathus*, on the contrary, the female appears to be by far the less common.

The forms collected together under the name of *Schizognathus* will have to be separated when adequate collections are available for study, for they do not constitute a homogeneous series; but, although in the absence of the male sex we are dependent on analogical reasoning, there is cause to believe that *Paranonca prasina*, Cast., will eventually be found truly congeneric with *Schizognathus prasinus*, Boisd., and *S. Macleayi*, Fisch., the typical species of the genus.

In consulting Hope's description of his genus *Stethaspis* I have been surprised to find that there is no correspondence with the Fabrician species named as its type, that species having been described from a specimen now in the British Museum. In order to clear up this fresh complication I have examined the original specimens in the Hope Collection, and found, as I was led to expect, that the true *Stethaspis* is based, not upon the New Zealand *Melolontha suturalis*, F., but upon the Australian *Xylonychus eucalypti*, Boisd. Hope appears to have had specimens of both before him, but the one which he identified as the Fabrician species (and which he correctly recorded as from Australia) belongs to the second species. It is probable that it was to the New Zealand insect he referred as a second species of the same genus; but he obviously did not make any careful examination of it, having apparently no information as to its habitat. There are considerable differences between the two forms, but I cannot agree with Lacordaire in placing them at opposite ends of the family.

There are thus two names for the Australian genus and none for that from New Zealand, for the name given by Boisdual (*Micronyx*) had been previously used in the Coleoptera. Zoologists may differ as to which of the names now employed should be retained, for *Xylonychus* was in use many years before the appearance of Hope's name, although generic characters were not attached to it until twenty years after. My own view is that, since a mistaken identification, such as that of Hope, must always be considered possible when the founder of a genus has not had before him the type of the

species upon which it is founded, a name is not entitled to recognition so long as it is unaccompanied by a description to afford evidence as to its identity. For this purpose, of course, description of the typical species, or even a statement that the genus is based upon an actual type specimen, must be admitted as sufficient.

I therefore consider that *eucalypti*, Boisd., and its congeners should properly be called *Stethaspis*, and for the New Zealand insect (*suturalis*, Fabr.) I propose the new name *Chlorochiton*. The genus has been fully characterized by Lacordaire, but I have given its essential characters in the table which follows, in order to compare it with its nearest allies, with which it was not associated by that entomologist. One of these has hitherto been wrongly placed with the Rutelidæ; this is *Modialis prasinella*, Fairm., a Chilean insect, whose closest affinity seems to me to be with *Phytolæma*, another Chilean genus belonging to the Heteronycides of Lacordaire.

The latter genus and *Chlorochiton* (*Stethaspis*, Lacord.) were assigned to different groups by Lacordaire on account of the produced metasternum of the latter. Later knowledge has shown that this feature is exceedingly inconstant and liable to be misleading as a basis of classification, and its occurrence in *Modialis* seems to me to necessitate the fusion of the groups *Stethaspides* and *Heteronycides*. With the exception of *Phytolæma* and one or two other small genera occurring on the Pacific coast of South America, all the insects placed in both divisions belong to the Australian Region, so that this course is supported by their geographical distribution.

The following table shows the differential characters of these hitherto scattered genera which I am proposing to bring together. Although all highly peculiar forms, and differing in important particulars, I consider that they have closer relationships among themselves than with any other genera known to me. They all agree in a superficially Ruteloid appearance, in their prominent front coxæ, distinct and emarginate labrum, and ligula fused with the mentum.

Junction of mentum and ligula straight; claws simple.

Antennæ 8-jointed; club 3-jointed ..... *Chlorochiton* (New Zeal.).

Antennæ 9-jointed; club 5- or 6-jointed .. *Stethaspis* (Australia).

Junction of mentum and ligula angulate; claws toothed.

Antennæ 8-jointed; club 4-jointed (♂);

metasternum not produced ..... *Phytolæma* (Chili).

Antennæ 9-jointed; club 3-jointed; meta-

sternum produced..... *Modialis* (Chili).

*Stethaspis* (*Xylonychus*, Lacord.) was placed with the true

Melolonthides by Lacordaire; but that author cannot, I think, have compared it with *Chlorochiton*, or he would not have widely separated them. He has described the front coxæ of the former as transverse, but a very casual examination shows that there is practically no difference in this respect between the two genera. He was also mistaken in the number of joints in the antennæ of *Chlorochiton* and *Phytolæma*, to both of which he attributed nine joints. As to the latter there has been a curious difference of opinion. Solier stated that there were nine antennal joints in *P. mutabilis*. Blanchard counted eight in the same species, as did Redtenbacher in *P. elaphocera*, while Lacordaire corroborated Solier. After a careful examination of two species of the genus I have concluded that the two last authors mistook a condylar process at the base of the first lamella of the club for an additional joint.

Of the other genera most nearly related to the foregoing, *Colymbomorpha* and *Pyronota* (respectively inhabiting Australia and New Zealand) are united in the Munich Catalogue (following the rather hesitating opinion of Burmeister). They are entirely distinct, however, differing widely in the antennæ, mouth, claws, and the front tibiæ of the male.

XLII.—On Two new Voles of the Subgenera *Pitymys* and *Microtus*. By G. E. H. BARRETT-HAMILTON.

I. *Microtus* (*Pitymys*) *Thomasi*, sp. n.

*Colour.* Above near "mummy-brown" \*, the general effect being due to the tips of the hairs, which are thus coloured for a length of about 2 millim.; the remaining 6 millim. are "slate-black," which colour, showing unevenly through the brown tips, gives the whole a finely grizzled appearance. The colour of the upper surface becomes lighter and more yellowish on the sides, but passes without any very distinct line of demarcation into the dirty light buff of the underside. Feet dirty white.

The ears are nearly hidden in the fur. The length of the hind foot is about three quarters that of the tail.

\* Names of colours placed in inverted commas are taken from Mr. Robert Ridgway's 'Nomenclature of Colours,' 1886.



The dimensions (in millimetres) as given by the collector are as follows:—

	Head and body.	Tail.	Hind foot.	Ear.
Collector's no. 1. ♂, 1st Sept., 1899. Beri, Montenegro, 60 metres . . . .	130	23	16	10
Collector's no. 85 (type of species). ♂, 1st Oct., 1900. Vranici, Monte- negro, 100 m. . . . .	127	20	15	10
Collector's no. 16. ♀, 25th March, 1900. Doljane, Montenegro, 40 m.	117	24	16	8
Collector's no. 86. ♀, 1st Oct., 1900. Vranici, Montenegro, 100 m. . . .	140	22	15	10

The *skull* resembles those of *M. Savii* and *subterraneus*, but is far larger and more massive. It is flattened above. The teeth are powerful. The interparietal is well formed and in shape is almost a true triangle. The palatal foramina are slightly contracted posteriorly. The pits at the hinder edge of the palate are well defined. The opening of the posterior nares is V-shaped and broad. The auditory bullæ are large.

The dimensions (in millimetres) are as follows:—

	Greatest length.	Basilar length.	Palate length.	Length of palatal foramina.	Greatest breadth at zygoma.	Breadth of brain- case above zygomata.	Length of upper molar series.	Length of lower molar series.
Collector's no. 85 (type of species) . . . . .	25	23.5	14	5	15.5	12	7	7
Collector's no. 16 . . . .	27	24	14.5	5.25	..	13	7	7
Collector's no. 86 . . . .	26	23	14	4.75	16	13	7	7

*Hab.* Montenegro, whence I have examined specimens caught at Beri, Vranici, and Doljane.

*Type*, a female, collector's no. 85. Taken 1st October, 1900, at Vranici, Montenegro, by Herr A. Führer.

This is a very interesting vole of peculiar coloration and, for its subgenus, exceptional size. It may be appropriately associated with the name of Mr. Oldfield Thomas, who has done so much to further the accurate study of European mammals.

## II. *Microtus* (*Microtus*) *Hartingi*, sp. n.

Colour and form resembling that of *M. Guentheri*, Danford & Alston, but yellower above and whiter beneath. In the type the upper surface is near grizzled "tawny olive," the grizzled appearance being due to the black tips of the hairs. The under surface is white, slightly washed with yellowish,

but more decidedly on the chin. The legs and feet are yellowish. The line of demarcation between the colours of the upper and lower surfaces is fairly well marked, passing along the upper lips to the shoulders and thence along the thighs to the anus. The tail is near "buff," lighter beneath. The bases of the hairs are everywhere "slate-grey." The type was skinned from spirit, but its coloration appears to be perfectly natural.

The ears project slightly above the fur.

The skull is more massive than that of *M. Guentheri*.

*Dimensions in millimetres.*

No. of specimen in B.M. Collection.	Head and body.	Tail.	Hind foot.	Ear.	Greatest length.	Skull.						
						Greatest breadth at zygoma.	Palatal length.	Length of upper molar series.	Length of lower molar series.	Basilar length.	Breadth of brain-case above zygomata.	Length of palatal foramina.
* 92. 12. 7. 1. ♂, Thessaly ( <i>Dr. F. Luffler</i> ) . . . . .	101	25 (28)	18 (20)	11	30	17.5	15	7.5	7.5	26.5	13	5
* 92. 12. 7. 2. ♀, ditto . . . . .												
93. 4. 5. 1. ♂, La- rissa, Thessaly, Jan. 1893 ( <i>J. E. Harting</i> ). (Type of species.) . . . .	107	26	18	..	29	17	15	7.5	7.5	27	12.5	5.5

*Hab.* Thessaly.

*Type*, a male, no. 93. 4. 5. 1 of the British Museum collection. From Larissa, Thessaly, January 1893. Presented by Mr. J. E. Harting.

This is the species of the Thessalian vole plagues.

I have pleasure in naming it after Mr. J. E. Harting, to whom the British Museum is indebted for the type specimen.

XLIII.—*Two new Australian Spiders of the Family*  
*Ctenizidæ.* By H. R. HOGG, M.A., F.Z.S.

SINCE I finished a paper on the Australian suborder of Mygalomorphae, which includes the above family, two fresh

\* These dimensions were taken from specimens in spirit, and are therefore, as regards the body, only approximate.

specimens have come to hand at the British Museum, from Western Australia and Tasmania respectively, of this interesting family, which, as they are both new, I propose to put on record.

I have already described several species of *Aganippe* from South Australia and one species which—partly from a distinct modification in the shape of the eye-space, but more particularly from an alteration in the shape of the spurs at the anterior end of the tibia of the first pair of legs (this being a character which is usually very persistent)—I rather thought should be placed in a separate genus (*Blakistonina*).

In the present specimen (a male from Roebourne, on the N.W. coast of Western Australia) the eyes are distinctly intermediate between the two above genera: the apophyses on the tibial joint of the palp are of an *Aganippe* character, while the tibial spur of the first pair of legs conforms more nearly to the *Blakistonina* pattern. Until we have more material I add it to the *Aganippe* series.

The specimen from Tasmania was sent to Dr. Peckham in America, and by him forwarded on to the British Museum. It is an associate of the New Zealand forms of the genus *Arbanitis*, L. Koch, but, from the difference between their tarsal claws and those depicted by L. Koch of his type species from Queensland, the type specimen of which is not known, I have always had considerable doubts as to whether they can be considered to come within the bounds of that genus, to which their eyes conform.

*Aganippe occidentalis*, sp. n.

Cephalothorax, mandibles, lip, maxillæ, sternum, and legs a uniform chocolate-brown colour, the hairs a darker, nearly



*Aganippe occidentalis*, sp. n.

a. Male palp.

b. Ditto, showing in profile apophyses on tibial joint.

c. Tibial joint of first pair of legs, showing spurs at anterior end.

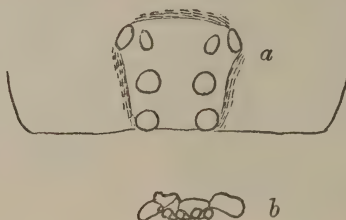
black-brown. The abdomen dark grey, nearly black-brown above and on the sides; light reddish brown on the under-side.

The cephalothorax descends sharply behind the eye-space, thence nearly straight to the cephalic fovea, where there is another rather sharp fall to the fovea, the thoracic part being fairly flat, but rising moderately from the edges.

The cephalic fovea is really straight and deep, but, being enlarged at each end, appears to curve slightly both forward and backward as looked at from behind or in front.

The rastellum consists of two or three rows of rather thin hardened bristles.

The rear row of eyes is slightly recurved, the side eyes being scarcely larger than the median, their narrow diameter apart. The rear median are their long diameter from the front median. The front median eyes, more than  $1\frac{1}{2}$  times the long diameter of the rear eyes, are 1 diameter apart; their laterals, which are smaller, are almost vertically below them,



*Aganippe occidentalis*, sp. n.

*a*, eyes; *b*, profile.

about the diameter of the latter distant. The distance between the outside edges of the front laterals only very slightly exceeds the same measurement of the front median and rear median, where it measures the same. Thus the outer edges of the rear and front median and front lateral eyes lie on the sides of a parallelogram.

The greatest breadth of the eye-space is 1.65 millim., its length 1.3.

The lip is nearly twice as broad as long, hollowed in front, and there are no spines on either lip or maxillæ.

The sternum is rather long, pear-shaped, truncate, and smallest in front; the rear pair of sigillæ moderately large, not quite marginal.

The third tarsal claw is quite small, without pectinations;



on the superior pair of claws there are about five teeth on the basal half, longest posteriorly.

Tarsi i. and ii. only are scopulated and none of the metatarsi.

The measurements in millimetres are as follows :—

	Long.	Broad.				
Cephalothorax....	7	4 in front. 6				
Abdomen.....	6	5				
Mandibles.....	2 hor <sup>y</sup> .	3 total length.				
Eye-space.....	1.65 × 1.3.					
			Coxæ.	Tr. & fem.	Pat. & tib.	Metat. & tars.
Legs.....	1.	3	8	7 $\frac{1}{2}$	7 $\frac{1}{2}$	= 26
	2.	3	7	7	7	= 24
	3.	3	6 $\frac{1}{2}$	6 $\frac{1}{2}$	8	= 24
	4.	3	9	9	12	= 33
Palpi.....	2 $\frac{1}{2}$	5 $\frac{1}{2}$	6 $\frac{1}{4}$	1 $\frac{3}{4}$	=	16

One male, from Roebourne, North-west Australia.

*Arbanitis maculipes*, sp. n.

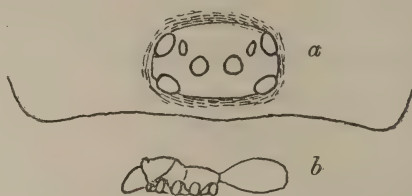
Cephalothorax yellow-brown, with three narrow darker brown lines reaching from the fovea to the eye-space; mandibles dark red-brown. Sternum, lip, and maxillæ dark yellow, inclining to brown; the legs are yellow; on the outer side at the anterior extremity of the femora of palpi and first and second pairs of legs is a dark brown patch, also similar smaller patches at base and middle of tibia and base of metatarsus and tarsus of same pairs of legs.

The abdomen is dark brown above, with yellow patches at each side anteriorly, dark brown with yellow chitinous parts underneath. Spinnerets yellow.

The cephalothorax is a long oval, truncate in front, the cephalic part highest about the middle of the longitudinal median line, thence sloping to the cephalic fovea, which is straight, but slightly curved round the base of the cephalic part.

The rear row of eyes is straight, the median their short diameter from the laterals and front median, and their distance from one another equals the total width of the front median pair. The latter are not quite their diameter apart; the line touching their lowest points also touches the highest points of the front laterals, which are, however, quite clear of them sideways. The front laterals are larger than the rear laterals, whose long diameter equals the front median. The clypeus

is the same width as the latter, of which there are a few on the lower inner corner of the maxillæ.



*Arbanitis maculipes*, sp. n.

*a*, eyes; *b*, profile.

The lip is slightly longer than broad and without spines.

The sternum is long and piriform, truncate in front.

There are scopulæ on the anterior tarsi only; three spines in the scopula at the anterior end and on the distal joint of the palp.

The first joint of the superior spinnerets is stout and longest, the third almost hemispherical. The inferior pair of spinnerets are short, stout, and close together.

Measurements in millimetres:—

	Broad.	Long.				
Cephalothorax . . . .	10	5 in front.				
		$7\frac{1}{2}$				
Abdomen . . . . .	8	$7\frac{1}{2}$				
Eye-space . . . . .	$1.6 \times .8$					
Clypeus . . . . .	.3					
			Tr. & Pat. & Metat.			
			Coxæ. fem. tib. & tars.			
Legs . . . . .	1.	4	8	8	6	= 26
	2.	$3\frac{1}{2}$	7	7	6	= $23\frac{1}{2}$
	3.	3	6	$5\frac{1}{2}$	6	= $20\frac{1}{2}$
	4.	$3\frac{1}{2}$	8	9	8	= $28\frac{1}{2}$
Palpi . . . . .		$3\frac{1}{2}$	6	5	$3\frac{1}{2}$	= 18
Superior spinnerets . . . .	..	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	= $1\frac{1}{4}$

At first sight this seems rather like Karsch's *Hermeas crispus* (Zeitschr. f. d. ges. Nat. Berlin, 1878, vol. li. p. 823). He, however, says the eyes are very near the margin of the clypeus, the rear row broader than the front. Scopula on tarsus and metatarsus i. and ii. Abdomen foxy red, with no mention of yellow spots, nor of the very distinctive brown spots on the two front pairs of legs, by all of which characters *A. maculipes* is clearly differentiated therefrom.

One female, from Tasmania (without closer designation).

XLIV.—On some new Genera and Species of Parasitic and Fossorial Hymenoptera from the Khasia Hills, Assam.  
By P. CAMERON.

[Concluded from p. 185.]

HERESIARCHINI.

NÆNARIA, gen. nov.

Mandibles toothless, becoming gradually narrowed. Labrum large. Antennæ dilated beyond the middle. Scutellum flat, not margined. Median segment areolated; the areola open at the base, about three times longer than broad; spiracles linear. Abdomen with seven segments, narrow, long; its apical segment bluntly rounded, large, not narrowed below; the sheath of the ovipositor projecting, pilose; the ventral keel extends to the end of the third segment. Areolet 5-angled, narrowed above. Clypeus broad, its apex transverse. Occiput rounded inwardly, not distinctly margined.

The abdomen is longer and narrower than usual, and is of almost equal width to the penultimate segment; it has a cylindrical appearance; the pygidium is semicircularly depressed between the cerci. Head larger than usual, as wide as the mesothorax. The apex of the hind femora reaches to the middle of the third abdominal segment. The middle abdominal segments project at the apices below.

A genus easily known by the large head, unidentate mandibles, and long, narrow, cylindrical abdomen.

*Nænaria grandiceps*, sp. n.

Black; the face, clypeus, labrum, inner orbits narrowly, the outer narrowly above, the base of the mandibles, a line on the pronotum, two short lines on the mesonotum, the scutellar keels, the scutellum broadly laterally, postscutellum, a square mark enclosing the spiracles on the metanotum, a larger mark on the apex extending on to the spiracular area, base of pronotum, the lower half of the propleuræ at the base, the lower half of the mesopleuræ in the middle, a line, gradually narrowed below, on the metapleuræ under the wings, and two irregular marks on the apex of the sternum, pale yellow. The four apical segments of the abdomen have a bluish hue, the apex of the petiole broadly, two large conical marks on the apex of the second segment, a large triangular one on the side of the third, a much smaller one rounded and

narrowed at the base, a narrow line on the apex of the fourth and fifth, a broader one on the sixth, and a still broader one on the seventh, yellow. The four front legs pallid yellow, the tibiæ and tarsi lined with black, the middle and hinder femora black, and the hinder coxæ yellow at the apex above and below. Wings hyaline, with a fulvous tint, especially at the base; the areolet is much narrowed above; the stigma fuscous. ♀.

Length 20 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Joints 8-16 of antennæ white. Face and clypeus closely punctured, the former covered with short, the latter with longer white hair. Thorax closely punctured. Scutellum slightly convex, its sides with a perpendicular slope. The basal half of the areola is transversely shagreened, the apical deeply furrowed laterally; the posterior median area stoutly, irregularly, transversely reticulated. The petiole is stoutly keeled down the sides, its middle irregularly punctured, the postpetiole closely punctured; the second and third segments longitudinally striated in the middle at the base. Gastrocœli smooth, deep, punctured on the outer side above.

*Chiaglas varipes*, sp. n.

Black; the inner orbits narrowly, the outer broadly on the lower half, the face, except for a bell-shaped black mark in the centre, which follows the shape of the clypeus, the palpi, a line on the pronotum, a similar line on the lower edge of the propleuræ, the tegulæ, tubercles, a large mark (rounded below) on the lower half of the mesopleuræ, two short lines on the mesonotum, the scutellums, two large marks, extending on to the pleuræ, on the apex of the median segment, the apex of the postpetiole, two large marks on the apex of the second segment, two smaller narrower ones on the apex of the third, the apices of the fourth, fifth, and sixth, and the whole of the seventh, the ventral fold and the apices of the ventral segments, pale yellow. Legs rufous; the anterior and the base of the tibiæ paler, more yellowish in tint; the four anterior coxæ and trochanters and the basal joint of the hinder trochanters yellow, the hinder tarsi and the apices of the anterior blackish. Wings hyaline, the stigma fuscous, the nervures darker. Antennæ with a broad white band in the middle, the top of the band marked with black. ♀.

Length 13 mm.

*Hab.* Khasia Hills. Coll. Rothney.



Head thickly covered with white pubescence below the antennæ; the face and, to a less extent, the clypeus punctured; the front closely, finely, transversely striated in the middle, its sides sparsely punctured. The median segment is more closely and strongly punctured than the mesopleuræ, the areola is irregularly reticulated, most strongly on the apex; the apical slope is irregularly striated, the striae running into reticulations on the sides. Postpetiole obscurely, finely, longitudinally striated in the middle; the second and third segments are closely and distinctly punctured in the middle; the gastrocoeli are stoutly striated at the base.

This is a smaller species than the type of the genus (*C. nigripes*, Ann. & Mag. Nat. Hist., Feb. 1902, p. 152), and may be easily separated from it by the rufous legs.

*Algathia* \* *albitarsis*, sp. n.

Black; the face, clypeus, a band on the middle of the upper inner orbits (narrowed obliquely on the lower half), an oval mark on the lower edge of the outer orbits, the edge of the pronotum behind, the scutellum, except at the base, the postscutellum, two large marks on the sides of the apex of the median segment, covering the spines above, the base of the pronotum, a small mark on the apex of the propleuræ behind, and the tubercles, white; the apex of the first abdominal segment, the base of the second, its apex more broadly, and the apex of the third segment, yellow, tinged with fulvous; the apical two segments clear pale yellow. The four front coxæ and trochanters are white, the rest of the legs fulvous, except the apices of the tarsi, which are black; the hinder legs rufous, their coxæ black, broadly white above and dull rufous at the base below; the trochanters on the outer side, the apex of the femora, of the tibiæ, and the basal joint of the tarsi, black; the rest of the tarsi white. Wings hyaline, the stigma and nervures black. Antennæ black, the scape beneath and a band in the middle white. ♂.

Length 10-11 mm.

*Hab.* Assam.

*Algathia khasiana*, sp. n.

Black; the face, clypeus, mandibles, the inner eye-orbits to the lower ocellus, a mark, longer than broad, behind the posterior, the outer orbits on the lower two thirds (narrow above, broad below), the malar space, the tegulæ, a narrow line on the pronotum, a broader one on the lower edge of

\* *Algathia*, Cam. Zeits. f. Hym. u. Dipt. 1902, p. 392.

the propleuræ, the tubercles, the lower third of the mesopleuræ, the scutellum, postscutellum, the outer areæ on the apex of the metanotum, the yellow extending on to the metapleuræ on the lower edge, lemon-yellow. Legs rufous; the four front coxæ and trochanters pale yellow; the hinder coxæ black, marked with obscure rufous on the inner side; the apex of the hinder femora black; the hinder tarsi white, the basal joint black. Wings hyaline, the nervures and stigma black. The antennæ longer than the body; black, the scape yellowish; the flagellum with a broad white ring. ♂.

Length 7 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Head closely punctured, the clypeus almost smooth; there is a short wide furrow below the ocelli. Thorax closely punctured; the base of the metanotum and the areola smooth; the rest of the metanotum and the spiracular area closely transversely punctured. Abdomen black; the apex of the first segment yellow; the apex of the second broadly rufous, and with a narrow yellowish line on the end; the apex of the third is narrowly rufous, and there is a large rufous mark on the apical half of the segment on the sides; the last segment is white, as is the case with all the species of this genus. The second and third segments are closely punctured; the second in the centre is closely, irregularly, and finely reticulated. The areola is wider than long, and is broadly rounded backwards at the base and apex.

*Myermo* \* *fumipennis*, sp. n.

Black, shining; the sides of the face broadly to the base of the mandibles, the sides of the clypeus broadly, the mark extending upwards to the outer side and above the foveæ, the malar space, the upper inner orbits (more broadly above than below), a line on the upper edge of the pronotum, a narrower one on the lower edge of the propleuræ, the tegulæ, tubercles, a large, oblique mark (narrowed and rounded at the apex) below the middle of the mesopleuræ, the scutellum, postscutellum, a large mark (obliquely narrowed behind) on the sides of the median segment and enclosing the spiracles, the apical half of the postpetiole, and a mark more or less narrowed inwardly on the sides of the abdominal segments, pale yellow. Wings fuscous violaceous, iridescent, the stigma and nervures black. Legs black, the greater part of the

\* *Myermo*, Cam. Ann. & Mag. Nat. Hist. ser. 7, vii. p. 523.

four anterior femora and the four anterior tibiæ in front pallid yellow. ♂.

Length 17-18 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Antennæ serrate towards the apex, the eleventh to seventeenth joints white below. Face and clypeus closely punctured; the apex of the clypeus more sparsely. Mesonotum closely and distinctly punctured. Median segment more coarsely punctured than the rest; the areola is more or less coarsely reticulated and stoutly, irregularly, longitudinally striated; the posterior median area is coarsely, irregularly, transversely striated; the outer areæ are coarsely reticulated. Pleuræ strongly and closely punctured. Postpetiole smooth; its base in the middle closely longitudinally striated. The marks on the abdominal segments are larger and more narrowed on the inner side on the second and third; the marks on the last segment are small and longer than broad.

*Myermo maculitarsis*, sp. n.

Length 15-16 mm. ♀ ♂.

*Hab.* Khasia Hills. Coll. Rothney.

This species is identical in the coloration of the body with *M. fumipennis*, but the legs are more widely marked with yellow, and, more particularly, there is a broad white band near the base of the tibiæ; otherwise the two may be known by the form of the areola: in *fumipennis* its apex is roundly bent inwardly; in the present species it is transverse, and it is finely and closely punctured throughout, and is without any striations; the posterior median area is closely rugosely punctured, not stoutly transversely striated.

There may be two small marks on the mesonotum; all the tibiæ have a broad white band near the base; the basal joint of all the tarsi is broadly white, and the other joints may be marked with white; the wings are clearer, more hyaline than in *fumipennis*, the stigma is testaceous; the gastrocoeli are not so strongly punctured, and the striæ are fewer, weaker, and more curved. The white ring on the antennæ wide. Face and clypeus rather strongly punctured; the front and vertex alutaceous, opaque; the clypeus edged with black. Mandibles white at the base, the middle rufous, the apex black. Palpi white. Thorax alutaceous. Scutellum sparsely and not very distinctly punctured; the median segment is more strongly punctured than the mesonotum, especially on the sides; the areola is broader than long

and is bluntly rounded behind. Pleuræ alutaceous, except under the hind wings, where there is a smooth spot of plumbeous hue.

#### PNEUSTICI.

##### FEDALMA, gen. nov.

Areolet irregular in shape, triangularly produced below; the apical nervure faint; stigma elongate. Apical tooth of mandibles elongate. Metathoracic areæ undefined; the areola twice longer than broad, its apical keel indistinct; the spiracles small, round. Abdomen twice the length of the thorax; the petiole long, narrow, the apex slightly dilated, curved; the small round spiracles are placed near the apex, behind the middle of postpetiole. Gastrocœli shallow. Ovipositor short, hardly projecting.

This genus cannot well be confounded with any of the genera with circular metathoracic spiracles. The apex of the clypeus is rounded; its sides at the top are widely and deeply depressed; the eyes are margined on the inner side; the wings are short, reaching only to the apex of the third abdominal segment; the transverse basal nervure is interstitial; the base of the second abdominal segment is depressed; the apical nervures in the hind wings are indistinct, almost obsolete.

The long tricoloured abdomen and the short wings give this insect a rather noteworthy appearance.

##### *Fedalma tricolor*, sp. n.

Black; the petiole and basal half of the second abdominal segment bright red; the third and the apices of the apical three segments are yellow; the front legs testaceous, their coxæ and trochanters pale yellow, as are also the middle trochanters and coxæ; the hinder coxæ rufous; the rest of the hinder legs broken off. Wings clear hyaline, the stigma and nervures testaceous. ♀.

Length 9 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Antennæ long, black, the basal two joints and a broad band on the middle yellowish white. Face, front, and vertex closely and distinctly punctured, the clypeus smooth, almost impunctate; the lower part of the front with stout, straight, transverse striæ, separated in the middle by a longitudinal one. Thorax closely punctured, the metathorax thickly covered with short white hair; it is elongate, and its apex has an



oblique slope; from the middle of the areola a transverse keel runs to join a longitudinal one placed inside the spiracles. There is a short shallow furrow on the sides of the mesosternum at the base; the sternal furrow is wide at the apex. Petiole smooth and shining; the red base of the second abdominal segment is closely, distinctly, and longitudinally striated; the black part is strongly aciculated.

## Fossores.

*Ampulex montana*, sp. n.

Length 16 mm. ♀.

*Hab.* Khasia Hills. Coll. Rothney.

This species agrees closely with *A. trigona*, Cam., in size and coloration, and in having the head obliquely narrowed behind the eyes, but may be known from it as follows:—

The upper third of the mesopleuræ coarsely deeply punctured; the sides of the median segment closely, distinctly, transversely striated; the vertex not distinctly furrowed in the middle behind.....	<i>montana</i> .
The upper third of the mesopleuræ not distinctly punctured; the sides of the median segment not closely, regularly, transversely striated; the vertex distinctly and deeply furrowed in the middle behind .....	<i>trigona</i> , Cam.

Antennæ entirely black; the third joint nearly as long as the following two united. Head green with bluish tints; the sides and apex of the clypeus and its central keel black. There is an oblique irregular row of punctures on the sides of the vertex; the antennal tubercles are large, and their keels extend halfway up the front; between them is an elongated tubercle. The clypeus has a row of punctures near the apex; its middle at the apex is bluntly rounded, with a shallow rounded incision on either side. The head is distinctly obliquely narrowed behind the eyes. Pronotum large; the apical part somewhat longer than the width at the base; smooth, the base depressed in the middle and with a distinct longitudinal furrow on the basal half. Mesonotum smooth in the middle; the sides with some large scattered punctures. Behind the scutellum is a row of stout longitudinal keels, which are weaker in the middle than on the sides. Median segment completely transversely striated; the striæ on the outer edge stouter than on the rest of the segment; the apex is smooth; the three central keels reach to this smooth part; the apical slope is transversely striated in the centre; the sides and top are irregularly striated-reticulated. The upper part of the mesopleuræ from above

the middle is coarsely, closely, irregularly punctured; the punctures are large, deep, and roundish. The upper part at the base and the apex above and below of the metapleuræ are irregularly perpendicularly striated. The anterior trochanters, the femora and tibiæ in front, and the four hinder trochanters and femora entirely red; the front femora and tibiæ behind and the middle tibiæ green; the hinder tibiæ green in front, dark purple behind; the tarsi are black; the penultimate joint of the hinder tarsi has the plate at the apex double the width it is at the base, and it becomes gradually wider towards the apex. Wings fuscous, with a distinct violaceous tinge; the nervures and stigma are black; the first transverse cubital nervure is represented only by a short stump on the lower side. Abdomen green, the back largely mixed with blue and purple tints; the second segment is about one third longer than its width at the apex; the underside of the petiole is closely, strongly, transversely striated.

*Ampulex himalayensis*, sp. n.

Head and thorax purple, mixed with dark green, the basal half of the hinder femora red, the apical purple; the wings fuscous hyaline, the nervures fuscous; the front and vertex closely, strongly, rugosely punctured. ♀.

Length 12 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Antennæ black; the flagellum thickly covered with a pale down; the third joint is as long as the following two joints united. Front and vertex purple, dark green immediately above the antennæ; the front is keeled in the middle from near the top, the keel ending below in a tubercle; the punctures on the sides run into reticulations; the apex of the clypeus is broadly rounded and is not separated from the sides. Prothorax for the greater part purple, above twice longer than the width of the apex; the apex sparsely punctured. The punctures on the lateral lobe of the mesonotum are large, round, and deep; on the centre they are smaller and fewer in number. The sides of the scutellum at the apex are punctured deeply and have some oblique stout keels. The sides of the postscutellum are strongly punctured. The metanotum is purple; the striæ are close and extend to the foveæ; beyond the foveæ they are few in number, broken, and irregular; the apical slope is irregularly reticulated; the lower part is thickly covered with white pubescence. Mesopleuræ strongly punctured, the upper part with stout, curved, irregular keels; the lower

edge is bordered by a stout keel. On the metapleuræ, below the upper keel, is an irregular curved one, which becomes fainter towards the end; the upper part and apex are striated, the striæ at the apex extending from the top to the bottom. The sides of the mesosternum are strongly punctured. The legs are for the most part dark blue; the basal half of the hinder femora red, the apical purple; the tarsal pad is short, not reaching to the middle of the joint; the tooth on the claw is small.

Comes near to *A. Rothneyi*, but is smaller; the blue and purple tints are more extended, the prothorax is shorter and broader, the mesopleuræ distinctly bordered below, the head is more and the thorax less strongly punctured.

*Ampulex interstitialis*, sp. n.

Dark blue mixed with green, the prothorax and mesothorax largely brassy; the four hinder femora red; the wings infuscated, the stigma and nervures fuscous. ♀.

Length 21 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Antennæ short, black; the third to sixth joints of equal length. The front immediately above the antennæ, the face, and clypeus distinctly keeled, the apical third of the clypeus becoming gradually wider towards the apex, the centre depressed, the sides bluntly rounded at the apex. Vertex broad; the eyes widely separated, not much converging above; at the top separated by the length of the basal three joints of the antennæ. The apical part of the pronotum is slighter broader than long, bears some large scattered punctures, and is deeply furrowed in the centre; it bears some long, stiff, brownish hairs, as does also the mesonotum; the parapsidal furrows are deep and complete; the middle lobe is bare, impunctate, and brownish; the lateral lobes are brassy and more closely and distinctly punctured. The scutellum is brownish, and has a row of punctures round the apex; the postscutellum is more brassy in tint. The median segment is green with blue and brassy tints; the three central keels reach to the base of the apical third of the central area; its sides at the apex are rounded; at its middle is a squarish area; and the apex is bordered by irregular, squarish, large areæ; on the basal half are four stout, longish, transverse keels, followed by two or three irregular short ones; the apical slope is shagreened and minutely closely punctured in the middle. There is a narrow curved furrow above the middle of the pronotum; near the bottom is a wider shallower one, followed, lower down, by a keel; below the

central furrow at the apex are some broad furrows. The sternal process is widely divergent; the lobes longish, narrowed and widely hollowed in the middle. The coxæ, trochanters, the fore femora, and the tibiæ behind are green; the apex of the fore femora and the tibiæ are rufous in front; the tibial and tarsal spines are rufous; the tarsal joints become gradually wider towards the apex, the pad reaches to the middle of the joint; the inner tooth of the claw is shorter and thicker than the outer. Wings smoky fuscous, clearer towards the apex; the nervures and stigma fuscous, testaceous towards the apex; there are only two transverse cubital nervures; the apical nervure on the radial cellule is broadly rounded and is united to the second transverse cubital; the appendicular cellule is open at the apex; the first recurrent nervure is received in the middle, the second in front of the middle of the cellule. Abdomen blue at the base, dark green in the centre, darker towards the apex; the second segment is wider at the base than at the apex, its length is not quite double the width at the apex.

A distinct species. Characteristic is the row of squarish arcæ bordering the apex of the median segment and the interstitial second transverse cubital nervure.

*Ampulex pilosa*, Cam.\*

This species appears to be the commonest form in Assam. The females vary from 15–25 mm. in length; the males also vary greatly in length, some being as small as 11 mm. The males are densely pilose like the females, and have the labrum and the greater part of the mandibles testaceous. Most of the males have the median segment and the abdomen for the greater part purple. The basal two segments are punctured all over, but not very closely; the apical segments are more closely rugosely punctured. The head is rather strongly punctured and, as usual, is obliquely narrowed behind the eyes.

The wings in both sexes vary in tint, ranging from light to dark smoky; the nervures may be black or fuscous; and the first transverse cubital nervure may be complete, indicated at the top and bottom only, or completely obliterated. A few examples show distinct brassy tints on the head and thorax. In the larger males there is a more or less well-defined longitudinal furrow in the middle of the head. The pleuræ and breast in the males are thickly covered with

\* Ann. & Mag. Nat. Hist. ser. 7, vol. v. p. 37.



soft white pubescence. The species in both sexes is much more thickly pubescent than any of the other Indian species; and the antennæ are also longer than usual.

*Discolia erythropoda*, sp. n.

Black; the front, vertex, a line on the upper outer eye-orbits, the sides of the metanotum, two small marks on the first and the greater part of the second and third abdominal segments above, lemon-yellow; the legs dark red and covered with reddish hair; the hair on the head, thorax, base of abdomen, and its ventral surface reddish; on the rest of the abdomen the hair is black: the wings fulvo-hyaline, darker and deeper in tint along the costa; in the centre, near the apex, is a longish fuscous cloud; the stigma and nervures dark fulvous. ♀.

Length 24–26 mm.

*Hab.* Khasia. Coll. Rothney.

Front and vertex shining, impunctate; the centre of the face is raised, surrounded by a smooth shining line, which is broadly rounded above. Mesonotum smooth and shining, rather strongly irregularly punctured round the edges. Scutellum sparsely punctured. Metanotum punctured somewhat closely, but not strongly, except on the centre at the base. The second dorsal segment of the abdomen is narrowly bordered with black at the base, more broadly at the apex; on the sides, united to the last by a narrow neck, is an irregular black mark; the third segment at the base and apex is irregularly lined with black, and the basal band projects in the centre, the projection becoming gradually narrowed towards the apex; the apical three segments are thickly covered with long black hair. ♀.

The male has the clypeus, except for a triangular black mark in the middle, the eye-incision, a large broad mark on the pronotum, two large marks on the base of the second abdominal segment, and the greater part of the third, lemon-yellow. The legs are coloured as in the female; the coxæ and trochanters are black; the antennæ are entirely black; the median segment wants the large lateral yellow marks found in the female; the apical streak seen in the female wings is absent, and the fulvous tint is almost absent, except along the fore margin, in the wings; the hair on the thorax is pale. The tegulæ in both sexes are rufous; the scape may be rufous in the female; and the ventral surface is entirely black. The base of the petiole has a straight

oblique slope. In fresh examples probably the whole of the mesonotum would be covered with reddish pubescence.

Belongs to the group of *Discolia histrionica*, F.

*Tiphia Rothneyi*, sp. n.

Black; the wings fuscous violaceous; the pro- and mesopleuræ smooth, impunctate; the postscutellum smooth, distinctly furrowed down the centre; the central keel on the median segment indistinct on the apical half of the segment. ♀.

Length 16-17 mm.

*Hab.* Khasia. Coll. Rothney.

Head above the antennæ coarsely punctured, shining; the clypeus closely punctured, its apex smooth and with a rounded incision. Pronotum coarsely punctured; the apex and the basal slope smooth. Mesonotum in the middle coarsely punctured; the scutellum with a row of large punctures round the sides and apex, and with a few punctures in the middle. Postscutellum smooth and deeply furrowed down the middle. Median segment opaque, shagreened; there are three keels, the middle keel interrupted beyond the middle; the apex depressed and striated behind the keel. Pro- and mesopleuræ smooth, shining, and almost glabrous; the basal half of the metapleuræ smooth, the apical closely punctured. Abdomen shining; there is a row of punctures on the apex of the first, and an interrupted one on the base of the second segment, which is depressed; the third, fourth, and fifth segments are minutely punctured, except in the middle; the apices of the dorsal segment and the greater part of the pygidium bear long fuscous pubescence; the ventral segments fringed with long white hair.

Characteristic of this species are the smooth impunctate pro- and mesopleuræ and the smooth deeply furrowed postscutellum. It comes close to *T. fumipennis*, Sm., from Borneo, which may be known from it by the mandibles being entirely ferruginous, by the pro- and mesopleuræ being distinctly punctured and thickly covered with longish white pubescence, and by the postscutellum not being furrowed. In *T. fumipennis* the median segment is opaque; the surface is strongly and closely aciculated, more strongly at the base than at the apex; the central keel does not reach to the apex of the basal part of the metanotum, on either side of it is an irregular, waved, longitudinal keel; on the apical third some stout irregularly curved keels which almost form reticulations; there is a distinct keel above the antennæ;

the apex of the clypeus is smooth and has a round incision; the scutellum is punctured round the edges, but the apex itself is smooth; the postscutellum is sparsely and more finely punctured at the apex; the basal half of the pygidium is closely and strongly punctured, and thickly covered with long black hair. The hinder wings are lighter coloured than the anterior.

*T. fumipennis* of Bingham (Fauna of Brit. India, Hym. p. 58) is clearly a different species from Smith's, and probably represents a new species.

### Ceropalidæ (olim *Pompilidæ*).

The name *Pompilus* has been found by Mr. Wm. J. Fox (Ent. News, xii. 1901, p. 268)—see also Mr. Wm. H. Ashmead, Canad. Ent., April 1902, p. 79—to be preoccupied, and its use therefore must cease in the Hymenoptera. Mr. Ashmead has revised the classification of the family. He has divided it into six subfamilies. His subfamily Aporinæ he divides into two tribes, the Anopliini and the Aporini. The former he divides into thirty-one genera, and it is practically equal to the genus *Pompilus* of Bingham's 'Fauna of Brit. India,' Hymen. If Mr. Ashmead's views are to be adopted, the Indian species must be split up into a large number of genera. If only one genus is to be used, as in Bingham's work, then the name *Anoplius*, Lep., must be adopted. Not having had time to examine the European and Asiatic species with the aid of Mr. Ashmead's papers, I use here the name *Anoplius* in the sense in which Bingham employs *Pompilus*. The latter name has been in use since 1798. Its disappearance and displacement by *Anoplius* will certainly cause some confusion for a time.

### *Anoplius omærus*, sp. n.

Black, shining, bare; the wings fuscous hyaline, the stigma and nervures black, the third cubital cellule appendiculated. ♀.

Length 10 mm.

*Hab.* Khasia. Coll. Rothney.

Antennæ black, bare. Head shining, bare, except for a few long black hairs on the vertex. Eyes distinctly converging above; the hinder ocelli are separated from each other by the same distance as they are from the eyes; there is a narrow longitudinal furrow on the lower half of the front. Apex of clypeus transverse. Mandibles black, piceous

near the apex. Palpi black. Thorax almost bare, impunctate, only slightly shining. Median segment with a broadly rounded slope from the base to the apex. Legs black; the tibial and tarsal spines black. Wings uniformly fuscous hyaline; the stigma and nervures black; the first transverse cubital nervure is obliquely bent above the middle, the larger lower part is more curved; the second is straight and oblique, the pedicle is not one fourth of its length; the third is roundly broadly curved; the first recurrent nervure is received shortly beyond, the second almost in the middle of the cellule; the accessory nervure in the hind wings is interstitial. Head not much developed behind the eyes; the occiput transverse.

This species cannot well be confounded with any of the described species with petiolated third cubital cellule. The second and third cubital cellules at the bottom are almost equal in length; the apical abdominal segments are sparsely covered with long black hairs. There are indications of silvery pubescence on the body.

*Anoplius icades*, sp. n.

Black; the basal two segments of the abdomen rufo-testaceous; the four anterior coxæ beneath, the clypeus, and the lower inner orbits pale yellowish white; the wings hyaline, their apical third smoky, the nervures and stigma black. ♂.

Length 8 mm.

*Hab.* Assam.

Antennæ stout; the joints not dilated beneath, those of the flagellum fuscous beneath. Head black, covered with a white pile; the clypeus and the inner orbits opposite the antennæ pale yellowish white. Mandibles pale yellowish white, their apices piceous; the palpi dark fuscous. Ocelli in a triangle; the hinder separated from the eyes by a distinctly greater distance than they are from each other. The thorax is covered with a white pile; the sides and base of the prothorax are narrowly pale testaceous. The median segment has a gradually rounded slope. Legs black; the four anterior coxæ are pale yellow beneath; the four anterior femora and tibiæ are more or less testaceous in front; the hinder femora are brownish towards the apex; the spurs are black. Wings hyaline, infuscated from the base of the stigma; the extreme apex is slightly paler in tint; the second and third cubital cellules are equal in length above and below; the first transverse cubital nervure is broadly



roundly curved, the second is slightly curved, the third is oblique; the first recurrent nervure is received shortly beyond, the second shortly behind, the middle of the cellule. The basal segment of the abdomen and the greater part of the second are rufo-testaceous; the other segments have the apices narrowly pale testaceous.

The apex of the clypeus is transverse in the middle, with the sides broadly rounded; the accessory nervure in the hind wings is interstitial.

In Bingham's arrangement (Faun. Brit. Ind., Hym p. 148) this species would come in near *acceptus*, Sm.

*Anoplius styrys*, sp. n.

Black; the lower two thirds of the inner and outer orbits, the apical half of the clypeus, a narrow interrupted line on the apex of the pronotum, the greater part of the frontal keel, and the basal fourth of the hinder femora on the outer side yellow; the wings hyaline, the apex smoky, the stigma and nervures fuscous. ♂.

Length 9 mm.

*Hab.* Assam.

Head smooth and shining, not developed behind the eyes, which distinctly converge above; a distinct furrow extends from the ocelli halfway down the front. There is a longish stout keel between the antennæ, which is yellow on the lower part. Apex of clypeus rounded. The flagellum of the antennæ yellow in the middle beneath. Thorax pruinose; the postscutellum, the base in the middle, and the sides of the median segment covered thickly with longish white pubescence. Legs black, the calcaria pale, the spines black. The second cubital cellule at the top is one third longer than the third; both the recurrent nervures are received shortly beyond the middle of the cellule.

The palpi are pale testaceous. Comes near to *P. maculipes*, Smith. Characteristic is the stout antennal keel.

*Anoplius atargates*, sp. n.

Black; the wings fuscous violaceous, with semihyaline patches; the third cubital cellule at the top more than half the length of the second, below not quite double its length. ♀.

Length 13 mm.

*Hab.* Khasia. Coll. Rothney.

Entirely black and covered with a silvery pile. Front indistinctly furrowed down the centre. Median segment

with a gradually rounded slope from the base to the apex; the base distinctly depressed in the middle. The apical abscissa of the radius is slightly roundly curved downwards towards the apex; the second cubital cellule at the top is one third longer than the third above and below; the first transverse cubital nervure is roundly curved, the top with a more oblique slope than the lower part; the third has a gradually rounded slope; the first recurrent nervure is received near the base of the apical third of the cellule, the second near the middle; the basal cellule in the fore wings is almost hyaline, the rest uniformly fuscous violaceous; the hinder wings are almost hyaline, darker towards the apex.

Comes near to *P. parenthope*, Cam., which may be separated from it thus:—

- |  |   |
|--|---|
| <p>The second and third cubital cellules below almost equal in length; above the second is distinctly more than double the length of the third; the wings dark fuscous violaceous throughout; the median segment furrowed in the middle; the long spur of the hinder tibiæ not reaching to the middle of the metatarsus.....</p> <p>The second cubital cellule below one third shorter than the third, above not double its length; the wings not uniformly fuscous violaceous; the median segment not furrowed in the middle; the long spur of the hinder tibiæ reaching to the middle of the metatarsus ....</p> | <p><i>parthenope</i>, Cam.</p> <p><i>atargates</i>.</p> |
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### Vespidæ.

#### *Rhynchium curvimaculatum*, sp. n.

Black; the scape of the antennæ beneath, a mark over and between the antennæ, a curved almost interrupted mark on the top of the clypeus, an interrupted mark rounded behind on the pronotum, an irregular mark on the mesopleuræ below the tegulæ, a transverse mark on the base of the post-scutellum, the sides of the metanotum to the teeth and narrow bands, somewhat interrupted in the middle, on the apices of the basal two abdominal segments, yellow. Legs black, the apex of the four hinder femora broadly rufous. Wings fuscous violaceous. ♀.

Length 23 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Front closely and strongly rugosely reticulated, the vertex more widely and irregularly punctured; in the centre behind is a curved, deep, smooth depression. Clypeus longitudinally rugosely punctured, the punctures longer than

broad and larger in its centre; the apex is depressed, irregularly punctured, and with a rounded incision in the middle. Mesonotum rugosely reticulated; the scutellum more strongly rugosely reticulated; the postscutellum coarsely longitudinally striated. Median segment reticulated above; the centre with curved striæ, the bottom alutaceous; the central keel is triangularly cleft and has a keel in the centre of the fork. Pro- and mesopleuræ rugosely reticulated; there is a longitudinal depression in the middle, which bears six perpendicular keels. The base and lower part of the metapleuræ smooth, the rest reticulated. The basal segments of the abdomen closely, but not very strongly, punctured; the third, fourth, and fifth are more strongly and deeply punctured than the basal; the apical sparsely punctured, smooth at the apex. The basal part of the petiole beneath is coarsely, irregularly, transversely striated; the apical smooth, bounded behind by a transverse furrow and covered with white pile.

This is the largest of the known Indian species.

*Rhynchium collinum*, sp. n.

Black; the scape of the antennæ below, a mark narrowed towards the middle above, over and between the antennæ, an interrupted line on the pronotum, the greater part of the basal half of the postscutellum, two marks on the sides of the median segment, the lower longer and narrower than the upper, a mark, longer and broader, in front of and below the tegulæ on the pleuræ, and a yellow line, interrupted in the middle, on the base of the basal two abdominal segments, yellow. Legs black, thickly covered with white pubescence; the extreme apex of the anterior femora, the apical third of the middle, and almost the apical portion of the hinder half of the posterior reddish; the apices of the tarsi rufous. Wings fuscous violaceous. ♀.

Length 17 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Front and vertex coarsely punctured, the punctures almost forming reticulations in the centre; they are thickly covered with long fuscous hair. Antennal keel distinct, sharp. Face and clypeus rugosely reticulated and punctured; the apex of clypeus projects in the middle, smooth and depressed; the sides obliquely project. Pro- and mesonotum closely rugosely punctured, the punctures larger and running into reticulations on apex of mesonotum. The scutellum is more strongly rugosely punctured. The basal half of postscutellum rugosely punctured, the apical longitudinally striated. The apical half

of the median segment is irregularly reticulated and punctured, the rest transversely striated; in the middle of the area is a longitudinal stout keel. Pro- and mesopleuræ rugosely reticulated and punctured; the apical part of the metapleuræ irregularly reticulated; the upper part of the base smooth, the lower indistinctly and irregularly reticulated. The basal two abdominal segments are closely, almost uniformly, but not deeply punctured; the third and following are much more deeply punctured, the last more irregularly than the others.

The male has the clypeus entirely yellow; the apical incision is wide and shallow; the four front tibiæ are marked with yellow on the outer side, and the bands on the basal two segments of the abdomen are united, but this may be also the case with the female.

### Apidæ.

#### *Halictus carianus*, sp. n.

Black, the pubescence white; the head and thorax closely and strongly punctured; the front with a narrow, not very distinct keel; the area on metanotum stoutly longitudinally striated; the wings fuscous violaceous, the nervures and stigma black. ♀.

Length 8 mm.

*Hab.* Khasia Hills. Coll. Rothney.

Head large, closely and strongly punctured, the punctures larger on the vertex than elsewhere; on the clypeus they are much sparser; the pubescence is sparse and white; the clypeus is fringed with long bright golden hair. The keel on the front is slender and is indistinct on the top. The pronotum projects distinctly above; its outer edge is raised into a sharp keel; the top inside this is flat and bears some irregular keels. The propleuræ above smooth and shining, the rest irregularly and somewhat strongly striated. The mesonotum is almost rugose. Mesopleuræ strongly rugosely punctured, the punctures running into reticulations in places. Postscutellar region strongly rugosely punctured. The area on the median segment is longitudinally striated; the punctures are stout and are clearly separated. The apical slope is keeled on the top and on the sides, and there is a narrower central keel which commences near the top; it is aciculated and indistinctly irregularly striated near the top. The hair on the coxæ, trochanters, and femora is long and white, on the tibiæ it is black, on the underside of the tarsi it is rufous; the spurs pale; the claws rufous. The wings are paler at the base; both the recurrent nervures are almost interstitial. The hair on the ventral surface of the abdomen



is white, on the back it is darker; the pygidial area is rufous.

Comes near to *H. timidus* and *H. gutterosus*. The male is similar; the apical half of the clypeus is pallid yellow; the flagellum of the antennæ is fuscous beneath. The furrow near the base of the mesopleuræ is wide and stoutly striated; the tubercles are fringed behind with white pubescence.

This species is easily known by the violaceous wings, by the strongly punctured head and thorax, and by the strongly keeled prothorax and median segment.

*Halictus trincomalicus*, sp. n.

Dark blue, with brassy tints, thickly covered with white pubescence; the base of the median segment irregularly longitudinally striated; the apices of the abdominal segments brownish; the anal rima dark brown; the wings hyaline, the stigma and nervures fuscous. ♀.

Length 6 mm.

*Hab.* Trincomali, Ceylon (*Col. Yerbury*).

Antennæ stout, black, the apical joint fuscous; the scape shining, covered sparsely with short pale hair. Head closely and distinctly punctured; the face brassy and more sparsely punctured than the rest; the base of the clypeus more sparsely and less strongly punctured than the apical half, which is dark purple. Mandibles ferruginous. Front indistinctly keeled. Pro- and mesothorax shining, punctured, but not strongly or closely, and thickly covered with white hair. Median segment closely and distinctly punctured; the striæ on the base are irregular, longitudinal in the middle, more oblique on the sides. Legs black; the calcaria testaceous; the pubescence white, on the metatarsus fulvous. Abdomen shining, impunctate; the apices of all the segments brownish; the anal rima dark brown; the apex of the anal segment in the centre and laterally lighter, more testaceous in colour; the apex bears fulvous hair.

Comes near to *H. vernalis*, Sm.

*Mutilla acidalia*, Cam.

This species was described by me in Proc. Manch. Soc. 1897, p. 56, in both sexes, from Trincomali, Ceylon, where they were taken by Col. Yerbury. The species has been overlooked by Bingham, who does not mention it in his work on Indian Hymenoptera. The species is probably, as André suggests (Ann. Soc. Ent. Fr. 1899, p. 34), a form of *M. ceylanensis*, Sichel & Rad., Horæ Soc. Ent. Ross. vi. p. 247, of which *M. hexapos*, Sauss. (also from Ceylon), is certainly a variety.

## BIBLIOGRAPHICAL NOTICES.

*An Account of the Indian Triaxonia collected by the Royal Indian Marine Survey Ship 'Investigator.'* By FRANZ EILHARD SCHULZE, Ph.D., M.D., Professor of Zoology at the University of Berlin. The German original translated into English by ROBERT VON LENDENFELD, Ph.D., Professor of Zoology at the University of Prag. Calcutta: Printed by Order of the Trustees of the Indian Museum, 1902. Price 16 Rupees. 4to. Pp. 113; pls. xxiii.

THE work before us includes the substance of three separate papers published by Dr. Schulze in the 'Abhandlungen der Königl. Preussischen Akademie der Wissenschaften' for 1894, 1895, and 1900, on the Hexactinellida collected by the 'Investigator' in 1885-1898. These papers have been thoroughly revised by the author, and then translated into English.

Previous to the 'Challenger' expedition only four species of this beautiful group of sponges were known from the Indian Ocean. Upwards of fifty are now enumerated by Dr. Schulze, of which only twenty-one were known previous to the 'Investigator' expedition.

The group, however, is widely distributed in different parts of the world, and some of its representatives, such as the "Venus's flower-basket" from the Philippines (*Euplectella aspergillum*), and the glass-rope sponge from Japan (*Hyalonema Sieboldi*), may be seen in every museum. They are mostly deep-sea forms with skeletons frequently resembling spun glass or lacework, and are often of very elegant forms.

Dr. Schulze's work is too highly technical to appeal to any but specialists, except, perhaps, as regards the beautifully executed plates. He commences with an introduction, giving a list of the twenty-one species known before the 'Investigator' expedition; then follows the descriptive part of the work, in which two or three closely printed pages are usually devoted to each species; and the work concludes with three tables of the species known from the Indian Ocean, with full localities. The work is a valuable addition to the literature of one of the more modern branches of scientific exploration—deep-sea dredging.

*Who's Who.* London: Adam and Charles Black. 1903.

By this time nobody requires to be told the nature and aims of this most valuable book. As a work of reference it is indispensable. We take it for granted that there are few zoologists who do not possess it; our advice to those who do not is "get it."

A wise discrimination in the selection of individuals has most undoubtedly been exercised throughout the whole course of this work. We have searched the pages of the present volume diligently for the names of biologists, and have come to the conclusion that only a very few who deserve mention in these pages have been missed—their names may be reckoned on the fingers of one hand.

*Handbook of Instructions for Collectors.* London: The Trustees of the British Museum. 1902.

THIS little volume will undoubtedly prove a boon to collectors both at home and abroad.

In the space of some fourteen chapters the whole duties of a collector of natural-history specimens are set forth, so that in the compass of a small pocket-book he will find directions for the preservation, and often identification, of all kinds of specimens, from an elephant to microscopic organisms, fossils, plants, and minerals.

The capture and, where necessary, the killing of animals is also thoroughly dealt with. Furthermore, a complete list of the tools required, with many figures thereof, has also been included.

In a future edition, which is certain to be required, we should like to see special attention called to the need for the collection and preservation of birds' skeletons, and to the use of the alcoholometer not only as a test for spirit containing specimens, but also for the determination of the strength of clean spirit. It is not always possible to get reliable information as to the strength of spirit. With the help of the alcoholometer the collector can set all doubts at rest and save, perchance, most precious specimens.

This little work is well illustrated, well printed, and strongly bound.

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## PROCEEDINGS OF LEARNED SOCIETIES.

### GEOLOGICAL SOCIETY.

November 5th, 1902.—Prof. Charles Lapworth, LL.D., F.R.S.,  
President, in the Chair.

The following communications were read:—

1. 'The Fossil Flora of the Cumberland Coalfield, and the Palæobotanical Evidence with regard to the Age of the Beds.' By E. A. Newell Arber, Esq., M.A., F.G.S.

The succession of Upper Carboniferous rocks in the region in question is apparently twofold: an essentially arenaceous series, at least 600 feet thick, consisting of massive sandstones alternating with shales and fireclays, overlying argillaceous and carbonaceous deposits; the latter forming the productive portion of the coalfield and containing three great coal-seams, traceable throughout the district, although known locally under different names. The Upper or Sandstone Series has yielded very few plant-remains from its upper division, but from the lower division a long list is given of plants collected by the Author, or preserved in the Woodwardian Museum. A second list of plants, from the upper division of the Carbonaceous Series, is also given, nearly all the specimens having been collected

by the Author. The consideration of the palæobotanical evidence enables him to classify the rocks as follows:—

PERMIAN.	Brockram.		Lower Permian.
UPPER CARBONIFEROUS.	Sandstone Series.	Upper .....	(?) Transition Coal-Measures.
		Lower .....	Middle Coal-Measures.
	Productive measures.	Upper (Bannock and Main Bands).	
		Lower (?).....	(?) Lower Coal-Measures and Millstone Grit.

2. 'Some Remarks upon Mr. E. A. Newell Arber's Communication: On the Clarke Collection of Fossil Plants from New South Wales.' By Dr. F. Kurtz, Professor of Botany in the University of Córdoba, Argentine Republic.

The Author agrees with Mr. Arber's identification of *Rhiptozamites Goeperti*, which he takes to be a synonym of *Næggerathiopsis Hislopi*. *Podozamites elongatus*, however, he regards as different from *Næggerathiopsis Hislopi*. Reasons are given for holding this opinion. Further, the Author does not consider that there is sufficient evidence to warrant the separation of *Otopteris ovata* from *Rhacopteris inequilatera*, in which species it may be retained, perhaps as a variety. *Rh. inequilatera* has been found in the Argentine, and was described by Geinitz as *Otopteris argentina*. A bibliography is appended.

December 17th, 1902.—Prof. Charles Lapworth, LL.D., F.R.S.,  
President, in the Chair.

The following communication was read:—

'The Elk (*Alces machlis*, Gray) in the Thames Valley.' By Edwin Tulley Newton, Esq., F.R.S., F.G.S.

During the construction of the Staines Reservoirs some mammalian remains were obtained from the alluvium of the Wraysbury River, near the Thames at Youveney. At the request of Mr. T. I. Pocock, of the Geological Survey, who is working in the district, the engineers, Messrs. Walter Hunter & R. E. Middleton, courteously submitted their specimens to the Author, who recognized among them the skull and antlers, with other parts of the skeleton, of a true elk (*Alces machlis*). These are described; allusion is made to the earlier records of this animal in Britain; and its distribution in time in this country, on the continent of Europe, and in North America is also discussed. It appears that *Alces machlis* has been frequently found in peaty deposits in many parts of Great Britain and on the continent of Europe, but never in Britain in association with the mammoth; and it seems probable that in Europe and North America it was a rare



animal in Pleistocene times, if indeed it was present before the close of that period.

January 7, 1903.—Prof. Charles Lapworth, LL.D., F.R.S.,  
President, in the Chair.

The following communication was read:—

‘On the Discovery of an Ossiferous Cavern of Pliocene Age at Dove Holes, Buxton (Derbysire).’ By William Boyd Dawkins, M.A., D.Sc., F.R.S., F.G.S., Professor of Geology in Owens College, Victoria University (Manchester).

The Carboniferous Limestone, riddled with fissures and potholes, in the neighbourhood of Dove Holes, has from time to time, in the course of the working of the quarries, yielded remains of extinct mammalia of Pleistocene age. The latest discovery of a group of mammalia, of far higher antiquity than the Pleistocene, is now brought before this Society. The Victory Quarry, Bibbington, in which the discovery was made, is excavated in a rolling plateau of Carboniferous Limestone, from 1100 to 1200 feet above Ordnance datum, and forming at this spot the water-parting between the tributaries of the Goyte, flowing past Chapel-en-le-Frith westward into the Mersey, and those flowing southward and eastward, past Buxton, to join the Derwent. It is a little to the north of the centre of the divide. On the western side the limestone dips at an angle of  $15^{\circ}$  underneath the Yoredale sandstones and grit, which form the lower half of a range of hills, extending southward to Buxton and beyond. The upper half is composed of shales and sandstones of the Millstone Grit Series, that rise in Black Edge to a height of 1662 feet. The drainage of the eastern slope of these hills passes downward, until it arrives at the limestone, where it sinks into the rock, through the many swallow-holes which mark the upper boundary of the limestone. There are no surface-streams in the limestone in the immediate neighbourhood of the Victory Quarry, which, from its position on the divide, could not, under existing geographical conditions, receive the drainage from this western range of hills, or any other source.

In the course of working the quarry, in the beginning of 1901, a cave was discovered, and fully exposed in the course of 1902. It was about 90 feet long, 15 feet high, and 4 feet broad. It ran nearly horizontally north and south, and consisted of a large chamber and a small passage, both eroded in a master-joint. On the south it contracted to a dead end, now quarried away. Its continuation to the north is obscured by a great accumulation of broken rock and clay, which has not yet been removed. It was filled with a horizontally stratified red clay, containing angular and rolled pebbles of limestone, and a few sandstone-pebbles from the Millstone Grit and Yoredale rocks. There were also a few pebbles of white vein-quartz and of quartzite. Scattered through the mass were mammalian bones and teeth: some waterworn, and others

with sharp fractures. The contents had clearly been introduced into the cave by water, flowing under geographical conditions which no longer exist.

The mammalian remains belong to the following species :—

*Machairodus crenatidens*, Fabr.

*Hyæna* sp.

*Mastodon arvernensis*, Croiz. & Job.

*Elephas meridionalis*, Nesli.

*Rhinoceros etruscus*, Falc.

*Equus stenonis*, Nesli.

*Cervus etueriarum*, Croiz. & Job.

All these species are found in the Upper Pliocene deposits of France and Italy, and undoubtedly belong to that age. The *Mastodon*, elephant, rhinoceros, and horse occur also in Britain in the Upper Pliocene deposits of the Crag.

Some of the bones present the characteristic teeth-marks of the hyænas; and the preponderance of the remains of the young over the adult mastodons points to the selection by the hyænas, who could easily master the calves, while they did not as a rule attack the large and formidable adults. The Author has observed a similar selection in the case of mammoths in hyæna-dens, into which the remains had been brought by those cave-haunting animals. He therefore concludes that the animal-remains have been washed out of a hyæna-den, which then existed at a higher level, and carried down deep into the rock, into the cave in which they were found, along with the clay and pebbles brought down in flood-time from the Yoredale and Millstone-Grit hills.

The area of the Victory Quarry must then have been at the bottom of a valley, instead of in its present position on the divide. The denudation of the limestone which has taken place since that time is estimated at not less than 330 feet—an amount sufficient to destroy the ravine formed by the stream above the bone-cave, and all the caves and rock-shelters in the district, which were accessible to the Upper Pliocene mammalia.

The Author appends a map illustrating the physical geography of the British Isles in Upper Pliocene time. In it the British area is represented as joined to the Continent by a barrier of land, extending from the Straits of Dover, westward, as far as the 100-fathom line in the Atlantic, which sweeps southward from Scandinavia, off the West of Ireland, into the Bay of Biscay. There were then no physical barriers to forbid the migration of *Machairodus*, *Mastodon*, *Elephas meridionalis*, and the rest, from Central and Southern France into Britain. They could find their way freely from the valleys of the Loire and the Garonne, across the valley now occupied by the English Channel, into England and, it may be added, Ireland. Over this area the animals migrated in the Upper Pliocene age. The discovery of a few of them in Derbyshire is to be looked upon as a monument of their former existence over the whole of this region. It is also a striking example of the great destruction of the surface which has taken place since that time, and of the imperfection of the geological record. It is the only cave in Europe that has yielded remains of the remote Pliocene Epoch.

# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

No. 64. APRIL 1903.

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XLV.—*Descriptions of new Syntomidæ and Arctiadæ.*

By Sir GEORGE F. HAMPSON, Bart., F.Z.S.

THE following species of Syntomidæ and Arctiadæ form a second supplement to the first three volumes of the 'Catalogue of Lepidoptera Phalænæ of the British Museum,' the first paper on the subject having been published in the Ann. & Mag. Nat. Hist. ser. 7, vol. viii. pp. 165–186 (1901), and the numbers before the species indicating the position of the species in the classification adopted in those volumes. The types are in the British Museum.

### Syntomidæ.

#### 58 a. *Trichæta proleuca*, sp. n.

Black, shot with purple; frons and fore coxæ in front white; antennæ white at tips. Fore wing with quadrate hyaline antemedial patch below the cell and small postmedial spot above vein 1 sometimes connected with the antemedial patch; a postmedial band between veins 7 and 3, expanding outwards below vein 5.

*Hab.* SUMATRA, 2 ♂, 2 ♀ type. *Exp.* 30 millim.

#### 67 a. *Trichæta monoleuca*, sp. n.

♀. Black; frons and patches on patagia and pectus white;  
*Ann. & Mag. N. Hist. Ser. 7. Vol. xi.* 25

abdomen dorsally tinged with green and with white basal patch, the ventral surface with white segmental lines. Fore wing with elongate hyaline patch below cell and base of vein 2, a small wedge-shaped spot in cell, a larger spot above vein 6, and a rounded spot above and below vein 4. Hind wing with hyaline patch below the cell and between veins 2 and 5.

*Hab.* SINGAPORE (*Ridley*), 1 ♀ type. *Exp.* 30 millim.

114 a. *Syntomis endocrocis*, sp. n.

♀. Black, suffused with brilliant blue; antennæ white at tips; pectus with lateral scarlet patches; abdomen with scarlet dorsal patch at base and dorsal and lateral bands on third, fourth, and fifth segments. Fore wing with the costal area metallic green; a hyaline patch below base of cell, with its lower part orange; a wedge-shaped patch in end of cell and oblique patch below vein 2; an elongate patch above vein 6 and patches above veins 3 and 4. Hind wing with a patch below base of cell, its upper part hyaline, its lower part orange; a patch above vein 2 and point above 5.

*Hab.* MASHONALAND, Salisbury (*Marshall*), 1 ♀. *Exp.* 40 millim.

115 a. *Syntomis rubritincta*, sp. n.

Head, thorax, and abdomen black, shot with blue-green; antennæ white at tips; patagia with some reddish-brown hair; pectus with cupreous-red patches; frons, coxæ of male, and parts of tibiæ and tarsi ochreous white; abdomen with dorsal scarlet band on first segment and dorsal and lateral bands on third, fourth, and fifth. Wings shot with purple, the costal area of fore wing with green, the patches reddish hyaline. Fore wing with the inner area cupreous red to beyond middle; a patch below base of cell; a wedge-shaped patch in end of cell; an oblique patch below vein 2 extending nearly to termen; an elongate patch above vein 6 and patches above veins 3 and 4. Hind wing with the basal half reddish hyaline, on inner area extending nearly to tornus; a rounded postmedial patch above veins 2 and 3; cilia brownish towards tornus.

*Hab.* BR. E. AFRICA, Londiani (*Betton*), 4 ♂, 4 ♀ type. *Exp.* 36 millim.

193 a. *Syntomis melanocera*, sp. n.

♂. Black, shot with bright purple; pectus with lateral orange patches; abdomen with dorsal orange patch on first



segment and dorsal and lateral band on fifth segment. Fore wing with small quadrate subbasal hyaline patch below the cell, a quadrate patch in end of cell and oblique wedge-shaped patch below vein 2 and elongate spots above veins 6, 4, 3. Hind wing with hyaline spot below the cell, a spot above vein 2, and sometimes a small spot above vein 3, the spots varying much in size.

*Hab.* N. CHINA, Wei-ha-wei, 1 ♂ type; Leu-kung-tau (*J. B. Fletcher*), 8 ♂. *Exp.* 28-32 millim.

212 a. *Eressa xanthostacta*, sp. n.

♂. Fuscous brown. Head orange, except palpi, antennæ, and a band between their bases; tegulæ and patches on patagia, pro- and metathorax orange; fore and mid legs fuscous brown, hind legs pale red-brown; abdomen with seven orange bands, the anal tuft orange, with brown dorsal patch. Fore wing with semihyaline orange angled spot below origin of vein 2, a quadrate spot in end of cell and small rounded spots above bases of veins 2, 3, 4, and 6. Hind wing with small orange spots in and below cell and above veins 2 and 3.

♀. Hind legs dark; abdomen with six orange bands, the anal tuft greyish brown.

*Hab.* QUEENSLAND, Townsville (*Dodd*), 1 ♂, 1 ♀ type. *Exp.*, ♂ 28, ♀ 32 millim.

233 a. *Epitoxis albicincta*, sp. n.

♂. Black, slightly shot with blue; head, thorax, and legs with some white hair; abdomen with narrow segmental white bands. Fore wing with slight white streaks below costa and costal nervure; a quadrate hyaline patch below base of cell; an elongate patch in end of cell; an oblique patch below vein 2; an elongate spot above vein 6 and spots above veins 3 and 4. Hind wing with basal hyaline patch from cell to inner margin; a postmedial spot between veins 2 and 3; cilia white at tips.

*Hab.* BR. E. AFRICA, Fort Ternan (*Betton*), 1 ♂ type. *Exp.* 28 millim.

233 b. *Epitoxis nigra*, sp. n.

♂. Black; head and thorax with a little yellowish hair; abdomen with lateral yellow line not reaching extremity. Fore wing with quadrate hyaline patch below base of cell; an elongate patch in end of cell; an oblique patch below

vein 2; an elongate spot above vein 6 and spots above veins 3 and 4. Hind wing with patch below base of cell and rather small spot above vein 2; cilia of inner margin whitish.

*Hab.* GAZALAND, Mt. Chirinda (*Marshall*), 1 ♂ type. *Exp.* 32 millim.

310 a. *Sphecosoma nigriceps*, sp. n.

♂. Head and thorax black; palpi with some yellow hair at base and whitish in front; tegulæ with yellow band; patagia with yellow streaks; pectus and legs yellow; abdomen with the first segment yellow, blackish at sides, the next three fulvous, with yellow segmental lines, the terminal four blackish with yellow segmental lines, the ventral surface yellow. Wings hyaline, the veins and margins narrowly brown; both wings with the costa and fore wing with the inner margin yellow; the costal half of fore wing clouded with pale brown.

*Hab.* BOLIVIA (*Berg*), 1 ♂ type. *Exp.* 26 millim.

607 a. *Saurita cryptoleuca*, sp. n.

♂. Black; vertex of head with metallic blue points behind ocelli; tegulæ with some blue scales; shoulders with vermilion points, metathorax with vermilion spot; abdomen with a few dorsal blue scales on first segment, the two penultimate segments with lateral spots and the last segment with dorsal patch. Fore wing with the cell hyaline, intersected by the black discal streak, a hyaline fascia below the cell and slight marks just beyond its extremity. Hind wing with hyaline fascia below the cell, extending just into and beyond it. Underside suffused with white, except costal area of fore wing and cell and costal area to beyond middle of hind wing.

*Hab.* BRAZIL, Organ Mountains, Tijuca (*R. J. Wagner*), 1 ♂ type. *Exp.* 32 millim.

674 a. *Euchromia vitiensis*, sp. n.

Black; frons and coxæ in front white; vertex of head, tegulæ, patagia, and sides of pectus with patches of metallic blue; abdomen with orange-red bands on first and fourth segments dorsally and on third and fourth ventrally, and with dorsal, lateral, and sublateral series of metallic blue spots. Fore wing with metallic blue spots at base and end of cell; an elongate hyaline antemedial spot below base of cell, quadrate spots in and below end of cell, and elongate spots above veins 2, 3, 4, and 6. Hind wing with hyaline patch at base

in and below cell; a metallic blue mark on discocellulars and a band beyond the cell between veins 7 and 2.

*Hab.* FIJI, 1 ♂, 3 ♀ type. *Exp.* 40 millim.

850 a. *Teucer brunnea*, sp. n.

♂. Dull reddish brown; neck with orange ring; tarsi with pale rings; abdomen with orange subdorsal spots on fifth, sixth, and seventh segments and white sublateral fasciæ. Fore wing with slight discoidal point on a very obscure medial dark band, angled at lower angle of cell; an indistinct pale dentate subterminal line.

*Hab.* ARGENTINA, Goya (*Perrens*), 1 ♂ type. *Exp.* 26 millim.

1182 a. *Hyaleucerea picticeps*, sp. n.

♂. Black-brown; back of head with two brilliant crimson spots; coxæ crimson; abdomen with lateral metallic blue patches. Fore wing with semihyaline streaks in cell, below the cell, and before and above origin of vein 2, the area below them greyish; semihyaline patches beyond the cell above veins 6 and 5, the area from below them to termen above tornus greyish. Hind wing hyaline, the veins black; a terminal blue-black band with irregular inner edge expanding at costa and from vein 2 to inner margin.

*Hab.* BRAZIL, Organ Mountains, Tijuca (*S. R. Wagner*), 1 ♂ type. *Exp.* 42 millim.

Arctiadæ.

NOLINÆ.

17 b. *Celama omphalota*, sp. n.

♂. White; palpi and antennæ pale reddish brown; patagia with rufous spots; legs tinged with fuscous; abdomen tinged with pale rufous. Fore wing tinged with pale rufous in places, especially on basal half of inner area and on termen; the buttons of raised scales in cell near base and at middle large, silvery and black mixed; the antemedial line only visible from cell to inner margin and obliquely curved; a pale rufous spot on middle of costa; the postmedial line punctiform, bent outwards below costa and at vein 3 strongly recurved; a trisinate subterminal line. Hind wing tinged with pale reddish brown.

*Hab.* W. AFRICA, Old Calabar (*Crompton*), 2 ♂ type. *Exp.* 16 millim.

21 b. *Celama fovifera*, sp. n.

♂. Antennæ ciliated; fore wing with an elongate hyaline fovea in end of cell. Pure white; palpi tinged with black at sides; legs irrorated with black, the tarsi black, ringed with white. Fore wing with curved black subbasal line from cell to median nervure, with brown and black scale-fan on its outer edge in cell; an interrupted black antemedial line, oblique from costa to below cell, where it is angled, obsolete below submedian fold, with a large brown and black scale-fan on its outer edge in cell; a similar scale-fan at upper angle of cell, with some black irroration below it at lower angle and a black patch above it on costa; an interrupted, irregularly and minutely dentate postmedial line excurved from costa to vein 4, then incurved; a trisinate subterminal line with black suffusion in its curves; some brown suffusion on termen. Hind wing with the termen slightly tinged with fuscous.

*Hab.* QUEENSLAND, Townsville (*Dodd*), 1 ♂ type. *Exp.* 16 millim.

126 a. *Ræselia infuscata*, sp. n.

♂. Head and thorax grey, tinged with fuscous and irrorated with black; abdomen brownish white, the ventral surface irrorated with black. Fore wing grey, tinged with fuscous and irrorated and suffused with black to the postmedial line; the tufts in cell blackish; the antemedial line hardly traceable on costal area, strongly angled outwards on median nervure and vein 1 and inwards in submedian fold; the postmedial line highly dentate, very oblique from costa to vein 4, where it is angled, then inwardly oblique and double; an indistinct irregular subterminal line, bent inwards to costa; a terminal series of points. Hind wing white, suffused with fuscous.

*Hab.* MASHONALAND, Umtali (*Marshall*), 1 ♂ type. *Exp.* 22 millim.

*LITHOSIANÆ.*226 a. *Lexis minima*, sp. n.

♂. Uniform bright silky straw-colour. Fore wing with vein 6 from the cell; hind wing slightly paler.

*Hab.* NEW GUINEA, Port Moresby (*Kowald*), 2 ♂ type. *Exp.* 16 millim.



233 a. *Phryganopsis atrescens*, sp. n.

♀. Black-brown; palpi, back of head, tegulæ, stripes on legs, ventral surface of abdomen, and anal tuft orange-yellow. Fore wing with the costal area orange-yellow, narrowing to a point before apex; cilia yellow. Hind wing with the termen and cilia yellow, diffused inwards in submedian interspace.

*Hab.* CAPE COLONY, Grahamstown, 1 ♀ type. *Exp.* 22 millim.

297 a. *Ilema melasonea*, sp. n.

♀. Head pale orange-yellow; palpi black at tips; thorax greyish fuscous, with ochreous spot on metathorax; legs streaked with ochreous; abdomen grey, the anal tuft and ventral surface ochreous. Fore wing brownish grey; the costal area whitish to beyond the postmedial band, the costal edge ochreous; the postmedial band black, somewhat diffused, oblique from costa to discal fold, where it is angled, then incurved, somewhat narrower and expanding in submedian fold. Hind wing pale yellow. Fore wing with veins 3, 4 stalked; 6 from upper angle; 7, 8, 9 stalked; 11 anastomosing with 12.

*Hab.* BR. E. AFRICA, Lagari (*Betton*), 1 ♀ type. *Exp.* 36 millim.

## Genus MICRILEMA, nov.

Proboscis fully developed; palpi short, porrect; antennæ of male minutely serrate and with long fasciculate cilia; tibiæ with the spurs moderate. Fore wing long and narrow; vein 2 from middle of cell, curved at base; 3 from well before angle; 5 absent; 6 shortly stalked with 7, 8, 9; 10 from cell; 11 anastomosing with 12. Hind wing with vein 2 from middle of cell; 3, 4 from angle; 5 absent; 6, 7 shortly stalked; 8 from middle of cell.

374 a. *Micrilema Craushayi*, sp. n.

♂. Head, thorax, and abdomen black, suffused with leaden grey; back of head with two yellow spots. Fore wing leaden fuscous; a broad costal orange fascia. Hind wing orange, a little leaden fuscous at base; cilia leaden fuscous, except at tornus. Underside of fore wing orange, with diffused fuscous streaks from base and a slight discoidal spot.

*Hab.* BASUTOLAND, Machacha, 10,000 feet (*Crawshay*), 3 ♂ type. *Exp.* 20 millim.

## Genus ANAPHOSIA, nov.

Proboscis fully developed; palpi porrect, not reaching beyond the rounded frontal prominence; antennæ of male ciliated; tibiæ with the spurs moderate; the fore tibiæ with long curved claw on inner side and short claw on outer. Fore wing long and narrow; vein 2 from middle of cell; 3 from well before angle; 4, 5 from angle; 6 from upper angle; 9 from 10 anastomosing with 8 to form the areole; 11 free. Hind wing with vein 2 from middle of cell; 3, 4, 5 from angle; 6, 7 shortly stalked.

528 a. *Anaphosia cyanogramma*, sp. n.

♂. Head, tegulæ, patagia, and abdomen orange-yellow; antennæ, tibiæ, and tarsi brown; thorax blue-black above. Fore wing pale yellow; markings black, shot with metallic blue; a costal fascia tapering to apex; a fascia on inner margin from near base to tornus, tapering at extremities; a slightly curved medial line; a postmedial line oblique from costa to just beyond lower angle of cell, then slightly incurved, and giving off below vein 6 a fascia curved upwards to termen, and below vein 4 an oblique fascia; cilia blue-black. Hind wing pale yellow.

*Hab.* MASHONALAND, Mpodzi River (*Marshall*), 1 ♂ type.  
*Exp.* 40 millim.

544 a. *Stictane apicalis*, sp. n.

♀. White; palpi, frons, antennæ, and tarsi fuscous; abdomen brownish. Fore wing with indistinct diffused brownish antemedial patches in cell and above inner margin; a similar postmedial patch above inner margin and a spot on costa; the apical area tinged with fuscous and with a blackish subapical spot; cilia brown. Hind wing brownish white.

*Hab.* W. AFRICA, Old Calabar (*Crompton*), 1 ♀ type.  
*Exp.* 14 millim.

575 a. *Darantasia pervittata*, sp. n.

♀. Head and thorax orange-yellow; antennæ brownish; abdomen black; the terminal segments orange. Fore wing brown, suffused with purple; the base orange-yellow, with irregular outer edge, emitting a fascia on costa to before middle and another in submedian fold to near termen; a very obliquely curved postmedial band from just below costa to vein 2, tapering at extremities. Hind wing brown; a large orange-yellow patch from just below middle of costa to near

termen at submedian fold, on underside produced towards base below the cell.

*Hab.* S.W. NEW GUINEA, Kapaur (*Doherty*), 1 ♀ type.  
*Exp.* 24 millim.

579 a. *Heliosia micra*, sp. n.

♂. Head, thorax, and abdomen pale yellow. Fore wing orange-yellow, with indistinct waved antemedial, postmedial, and subterminal lines formed of dark scales. Hind wing pale yellow.

*Hab.* QUEENSLAND, Cedar Bay (*Meek*), 1 ♂ type. *Exp.* 12 millim.

593 a. *Scaptosyle fovealis*, sp. n.

Fore wing of male with large fovea below the cell containing flocculent tufts of scales; the cell long, narrow, curved, the veins distorted and vein 2 becoming coincident with 3, 6 from below angle of cell. Hind wing with the costa highly lobed, with a large glandular swelling below its middle, the veins distorted, and veins 3, 4 and 6, 7 coincident.

♂. Head and tegulæ golden yellow; thorax and abdomen red-brown, tinged with purple. Fore wing red-brown, tinged with purple and suffused with blue-green at edges of yellow areas; an antemedial golden-yellow band expanding towards costa; a terminal yellow band wide at costa, narrowing to a point at tornus, the edge of brown area being angled outwards at vein 6. Hind wing with the basal area pale yellowish, the terminal half pale purplish brown, with some yellow on apical half of termen and cilia.

*Hab.* NEW GUINEA, Port Moresby (*Kowald*), 1 ♂ type.  
*Exp.* 16 millim.

642 a. *Chionæma flavicincta*, sp. n.

♂. Fore wing with the costal fringe moderate; a thick fringe of long hair on underside below the cell; the lobes large.

Head and thorax white; palpi black; antennæ red; tegulæ and patagia edged with scarlet; metathorax with scarlet patch; tibiæ and tarsi banded with orange; abdomen white, slightly tinged with red on dorsum, the anal tuft yellow. Fore wing white, the costal edge yellow; the sub-basal band scarlet, expanding towards costa and ending above inner margin; an antemedial scarlet band, excurved from costa to median nervure, then oblique, a black line on its inner edge; a black spot in end of cell and two on discocellulars;

a yellow and vermilion bar from costa before the postmedial scarlet band, which is erect from costa to submedian fold, then bent outwards, a black line on its outer edge except towards costa; a yellow terminal band with a slight red tinge above tornus. Hind wing pink, the costal area yellow; the cilia yellow at base, white at tips.

*Hab.* ASSAM, Khásis, 1 ♂ type. *Exp.* 34 millim.

645 a. *Chionæma selangorica*, sp. n.

♂. Head and thorax white; palpi and edges of tegulæ and patagia deep orange; legs banded with orange; abdomen orange, the ventral surface white. Fore wing white; the costal edge orange; a deep orange subbasal band excurved above inner margin; an antemedial band bent inwards to costa and emitting a short fascia in cell; two black discoidal spots; a postmedial band forking at costa, oblique and narrow to vein 4, where it is angled, then stronger and incurved; a broad terminal band. Hind wing and underside of fore wing pale orange, tinged with pink.

*Hab.* SELANGOR, Semangho, 2700 feet (*H. C. Robinson*), 1 ♂ type. *Exp.* 34 millim.

651 a. *Chionæma amēlæna*, sp. n.

♂. Fore wing with the outer lobe large, the inner small and closely applied.

Head and thorax white; palpi and antennæ vermilion; tegulæ and patagia edged with vermilion; metathorax with vermilion patch; tibiæ and tarsi banded with orange; abdomen dorsally yellow tinged with red, ventrally white. Fore wing white; the costal edge vermilion to antemedial line; the subbasal line excurved below costa, incurved at submedian fold, then bent outwards and finer; a rather broad antemedial band, slightly incurved below the cell; a triangular spot in end of cell; two small red discoidal spots, with some black on them; postmedial line forking towards costa, angled outwards at vein 4, then incurved, the costal edge vermilion; a dentate terminal band. Hind wing pale yellow, the termen suffused with red except at tornus.

*Hab.* SINGAPORE (*Ridley*), 1 ♂ type. *Exp.* 26 millim.

655 a. *Chionæma yunnanensis*, sp. n.

♀. White; palpi fuscous; tegulæ edged with orange; tibiæ and tarsi banded with fuscous. Fore wing with the costal edge orange to antemedial line; a subbasal orange



line from costa to submedian fold, an antemedial line slightly incurved to costa, then oblique; a black spot at middle of cell, with a point beyond it on median nervure and a discoidal spot; the postmedial orange line oblique from costa to vein 2, then erect, slightly incurved at discal fold. Underside of fore wing suffused with fuscous.

*Hab.* YUNNAN, Teng Yeuk (*H. E. Hobson*), 1 ♀ type. *Exp.* 30 millim.

682 a. *Chionæma capensis*, sp. n.

♂. White; palpi, tegulæ at base, and fore legs orange. Fore wing with some black scales at base of costa; an irregular waved orange subbasal band, with black scales on its outer edge; an antemedial band, with black line on its inner edge, incurved to costa, then oblique, a black point just beyond it in cell; the postmedial band expanding into a patch at costa, oblique to vein 3, then erect, and ending at tornus, some black scales on its outer side and traces of a black discoidal point on its inner side. Underside of fore wing with the costa orange to near apex.

*Hab.* CAPE COLONY, Grahamstown, 1 ♂ type. *Exp.* 22 millim.

695 a. *Eurosia fuliginea*, sp. n.

♂. Fuscous black, with a bluish tinge. Fore wing with small round whitish discoidal spot and slight whitish marks in submedian fold just before middle and below end of cell. Hind wing with hyaline patch below basal half of cell.

♀. Head and thorax tinged with olive-brown. Fore wing with the ground-colour pale olive-brown; the basal half suffused with black, leaving whitish subbasal and antemedial spots below the cell; black spots in middle and at end of cell, with a white spot between them; a diffused black postmedial line excurved round end of cell, then retracted; a diffused maculate subterminal band; a spot on middle of termen.

*Hab.* NATAL, Durban (*Leigh*), 1 ♂ type; CAPE COLONY, Annshaw (*Miss F. Barrett*), 1 ♀. *Exp.* 18 millim.

768 a. *Illice endoxantha*, sp. n.

Hind wing of male with the tornus produced to a very long lobe, with fringes of hair and scales on upper and under sides, the termen very strongly excised before it.

♂. Head, tegulæ, and patches on patagia yellowish white; a slight band above frons, antennæ and thorax purplish

brown; legs yellow, the fore legs purple-brown, with the first tarsal joint pale; abdomen orange. Fore wing purplish brown, with broad yellowish fascia on basal half of inner margin, a somewhat conical postmedial patch on costa, and semicircular patch on inner margin. Hind wing yellow, with the inner area orange; a small brown apical patch; veins 6, 7 stalked.

♀. Hind wing with the inner area yellow.

*Hab.* BRAZIL, Petropolis (*Doer*), 1 ♂, 1 ♀ type. *Exp.* 24 millim.

777 a. *Illice flagrans*, sp. n.

Head and thorax deep orange; frons, antennæ, and patagia black; legs black; abdomen crimson. Fore wing fuscous black, with orange-yellow fascia on inner margin, expanding into a conical patch before tornus. Hind wing scarlet, with black terminal band very wide at costa, narrowing to a point at tornus.

*Hab.* ARGENTINA, Goya (*Perrens*), 2 ♂, 5 ♀ type. *Exp.* 18 millim.

783 a. *Illice persimilis*, sp. n.

♂. Head, tegulæ, and patches on patagia yellowish white; palpi, frons, and thorax purplish brown; antennæ black, with white patches on the joints above; pectus, legs, and abdomen yellow, the fore legs striped with fuscous. Fore wing purplish brown, with broad yellowish-white fascia on basal half of inner margin; a somewhat conical postmedial patch on costa and inner margin. Hind wing yellow, with small apical brown patch.

♀. Fore wing without the postmedial patch on costa; hind wing and the discal area of fore wing on underside tinged with scarlet, the former with hardly a trace of brown at apex.

*Hab.* BRAZIL, Rio Janeiro (*Doer*), 2 ♂, 2 ♀ type. *Exp.* 22 millim.

783 b. *Illice cryptopyra*, sp. n.

Head, tegulæ, and patagia orange-yellow; thorax purplish fuscous; legs mostly purplish fuscous; abdomen scarlet. Fore wing fuscous, suffused with purple; an orange-yellow fascia on inner area from base to middle and semicircular postmedial patches on costa and inner margin. Hind wing scarlet, the cilia black. Underside of fore wing scarlet, with

the basal half of costa and a patch in and below end of cell black; a black terminal band with sinuous inner edge.

*Hab.* BRAZIL, Organ Mountains, Tijuca (*S. R. Wagner*), 1 ♂, 2 ♀ type. *Exp.* 24 millim.

868 a. *Parasiccia perirrorata*, sp. n.

♂. White, strongly irrorated with fuscous; palpi marked with black. Fore wing with diffused subbasal band; a curved antemedial band expanding at costa into a patch which is angled outwards below costa; a point in middle of cell, with a spot on costa above it; a discoidal lunule; a brownish band on inner side of the postmedial line, which is excurved below costa and at median nervules, then strongly incurved; an irregular subterminal line, angled inwards in discal fold and incurved below vein 3; a terminal series of small spots. Hind wing white, suffused with grey. Underside of fore wing fuscous grey; hind wing white, with indistinct discoidal spot and irregular subterminal line.

*Hab.* W. CHINA, Kia-ting-fu, 1 ♂ type; Omei-shán, 1 ♀. *Exp.* 28 millim.

873 a. *Ovipennis Binghami*, sp. n.

♀. Head and thorax white; palpi at base, antennæ, base of tegulæ, and a band across patagia and thorax fuscous; fore and mid legs and extremity of hind tibiæ and tarsi fuscous above; abdomen ochreous, with the terminal segments grey, the ventral surface white. Fore wing with the basal area orange, with obliquely sinuous outer edge; the rest of wing pale reddish brown, becoming fuscous towards apex, the margins white. Hind wing fuscous, the inner area pale reddish brown; the cilia white.

*Hab.* UPPER BURMA, Byingui, 2500 feet (*Bingham*), 1 ♀ type. *Exp.* 20 millim.

Genus PRINASURA, nov.

Type *P. pyrrhopsamma*.

Proboscis fully developed; palpi porrect to just beyond frons; antennæ of male ciliated; hind tibiæ with two pairs of spurs; abdomen clothed with rough hair. Fore wing rather short and broad, clothed with hair-like scales; veins 3 and 5 from near angle of cell; 6 from below upper angle; 7, 8, 9 stalked; 10 free; 11 anastomosing with 12. Hind wing with veins 3 and 5 from angle of cell; 4 absent; 6, 7 stalked; 8 from middle of cell.

898 b. *Prinasura pyrrhopsamma*, sp. n.

♂. Orange fulvous; antennæ and legs above blackish. Fore wing with black hair mixed with the orange; diffused dentate antemedial, medial, and postmedial black lines obtusely angled on median nervure; traces of a subterminal line; a terminal series of black points. Hind wing with fuscous-black terminal band, broad at costa, narrowing to a point at tornus.

*Hab.* NEW SOUTH WALES, Sydney (*Olliff*), 1 ♂ type.  
*Exp.* 24 millim.

Genus *CHRYSOMESIA*, nov.

Type *C. barbicostata*.

Proboscis fully developed; palpi porrect, extending as far as frons; antennæ of male ciliated; tibiæ with the spurs moderate. Fore wing with the cell very long and narrow; vein 2 from well before middle of cell; 3 from just beyond middle; 5 from well above angle; 6, 7 stalked; 8, 9, 10 absent; 11 free; male with a costal fold on upperside with a fringe of large scales, spatulate scales and hair from under it. Hind wing with the cell very long; vein 2 from before middle; 3 from well before angle; 5 from angle of discocellulars; 6, 7 stalked; 8 from middle of cell; male with a fringe of long hair below medial part of costa on upperside.

1151 a. *Chrysomesia barbicostata*, sp. n.

♂. Head and tegulæ golden yellow; palpi and antennæ rufous; thorax rufous, suffused with purple; pectus, legs, and abdomen ochreous, the last dorsally rufous towards extremity. Fore wing red-brown, suffused with purple, the medial half of wing golden yellow except costal fold and fringe; the basal area defined by an oblique blackish line and the terminal area by a curved line. Hind wing pale rufous, the area below the costal fold whitish.

*Hab.* NEW GUINEA, Port Moresby (*Kowald*), 1 ♂ type.  
*Exp.* 20 millim.

*ARCTIANÆ.*1220 a. *Prumala ignipicta*, sp. n.

♂. Antennæ bipectinate; hind wing with veins 6, 7 on a long stalk, 8 from near end of cell.

Head and thorax red-brown, the latter with some red hair



at sides; palpi and legs brown; abdomen scarlet, the ventral surface yellow. Fore wing yellow-brown; a small yellow patch below base of costa, suffused and edged with scarlet and with some dark spots on it; a yellow spot suffused with red on middle of inner margin; veins tinged with red. Hind wing pale yellow, tinged with scarlet. Underside ochreous.

*Hab.* BRAZIL, Organ Mountains, Tijuca (*S. R. Wagner*), 1 ♂ type. *Exp.* 36 millim.

1239 a. *Amaxia flavipuncta*, sp. n.

♂. Head, tegulæ, and base of patagia bright yellow; palpi white in front and with some crimson behind; antennæ brownish, white at tips; thorax pale brown, edged with crimson; pectus and legs white, fore femora brown above, the tibia yellow, with crimson spot; abdomen crimson, the ventral surface white. Fore wing yellow, a large basal brown patch extending below costa to before middle, and thence with irregular outer edge to termen above tornus, the veins crossing it, a streak in submedian fold, and two points in cell crimson; a yellow spot edged with crimson on middle of inner margin; a small brown spot in end of cell; a series beyond to cell, the spot above vein 5 displaced inwards; a postmedial series with the spots towards costa larger and edged with crimson; a subterminal series of small spots. Hind wing yellowish white, suffused with brown, except costal area and inner margin.

*Hab.* BRAZIL, Organ Mountains, Tijuca (*S. R. Wagner*), 1 ♂ type. *Exp.* 34 millim.

1769 a. *Diacrisia euryphlebia*, sp. n.

♂. Head and thorax yellowish white; palpi, patch on frons, tegulæ, patagia, and dorsal stripe on thorax black; pectus and stripes on legs black; mid and hind femora orange above; abdomen orange, with dorsal black bands, lateral stripe, and ventral series of spots. Fore wing yellowish white; the veins rather broadly striped with black, especially the medial part of vein 1; narrow stripes in cell and submedian fold; cilia yellow. Hind wing orange-yellow.

*Hab.* ZULULAND, Lower Tugela (*Reynolds*), 1 ♂ type. *Exp.* 38 millim.

XLVI.—*Rhynchotal Notes*.—XVII. Heteroptera: *Family Reduviidæ*. By W. L. DISTANT.

THE following contribution relates entirely to the family Reduviidæ, and contains descriptions of genera and species belonging to the collection in the British Museum. Some of these possess a peculiar interest in having been collected by old and well-known naturalists, such as P. H. Gosse in Jamaica, H. W. Bates on the Amazons, Hamlet Clark in Brazil, and A. R. Wallace in the Malayan Archipelago.

Fam. Reduviidæ.

*SALYAVATINÆ*.

*Lisarda æthiopica*, sp. n.

Brownish ochraceous; head, pronotum, scutellum, sternum, broad sublateral areas and a very narrow subobsolete central line to abdomen, spots to connexivum above and beneath, biannulations and apices of femora, biannulations to tibiæ (near base and apex), piceous; rostrum, coxæ, legs, and abdomen beneath luteous; hemelytra (especially membrane) with paler mottled markings; anterior spinous production of head prominent; first joint of antennæ shorter than head, about half the length of second; anterior lobe of pronotum centrally sulcate, and more narrowly discally sulcate on each lateral area, lateral angles subangularly prominent; body sparingly pilose; antennæ and legs longly pilose.

Long. 13 millim.

*Hab.* Brit. East Africa: Taru Desert (*C. S. Betton*, Brit. Mus.).

Differs from *L. cænosa*, Stål, by the non-rounded and subangularly prominent lateral pronotal angles.

*ACANTHASPINÆ*.

*Centrogonus ducalis*, sp. n.

Ochraceous; pronotum, scutellum, lateral areas of sternum, segmental fasciæ to abdomen, brownish ochraceous; head between and behind eyes (above and laterally), base of clavus and corium, apical angle of corium, membrane, and large segmental spots to connexivum piceous; ocelli pearly white; second joint of antennæ almost as long as head and pronotum together, anterior pronotal lobe with six long spines (two

discal and two on each lateral margin), posterior lobe finely rugulose, centrally finely sulcate, posterior angles longly spinous, the spines directed backward; apex of scutellum with a very long oblique spine; membrane about reaching the abdominal apex; antennæ very pale fuscous, first joint and extreme base and apex of second joint ochraceous.

Long. 26 millim.; exp. pronot. angl. 6 millim.

*Hab.* West Australia: Champion Bay (*H. Du Baulay*, Brit. Mus.).

*Edocla Slateri*, sp. n.

Piceous; head, antennæ, anterior angles and central disk of anterior pronotal lobe, two central spots near anterior margin, lateral angles, a very small spot before them, and narrow hind margin to posterior pronotal lobe, scutellar spine, base of clavus, base and a large subapical spot (extending from lateral to apical margins, angulate on each side) to corium, connexivum, coxæ, legs, abdomen, lateral margins of metasternum, and anterior acetabula pale luteous; annulation to first joint of antennæ, biannulations to femora and tibiæ, apices of tibiæ, spots to connexivum above and beneath, lateral areas and apex of abdomen, and the membrane pale violaceous brown; antennæ pilose, second joint more than twice the length of first; head transversely constricted behind eyes; first and second joints of rostrum about subequal in length; anterior angles of anterior pronotal lobe longly spinous, the spines suberect and a little recurved, anterior lobe sculptured, posterior lobe granulate, lateral angles spinous and recurved, scutellar spine long, suberect.

Long. 9 millim.; exp. pronot. angl. 3 millim.

*Hab.* Brit. India: Mysore (*H. K. Slater*, Brit. Mus.).

*Edocla pilosula*, sp. n.

Black, opaque; corium and membrane dark fuscous brown; abdomen beneath and femora castaneous; two spots to corium (one near base and one near centre of apical margin), spots to connexivum (above and beneath), extreme apices of femora, tibiæ, tarsi, and antennæ ochraceous; body and legs very longly pilose; head distinctly sulcate between the eyes, central lobe terminating in two small central spines; anterior lobe of pronotum with the anterior angles longly spinously produced and with four long erect spines near its posterior margin, posterior lobe granulate, with an obscure broad central sulcation, the lateral angles spinously produced;

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scutellar spine long, erect; bases and apices of tibiæ and apices of tarsi fuscous.

Long. 8 millim.

*Hab.* Brit. East Africa: Samburu (*C. S. Betton*, Brit. Mus.).

Resembling *E. quadrisignata*, Stål, but differing by the spined pronotum and the longly pilose body and legs.

*Acanthaspis Binghami*, sp. n.

Black; a spot behind eyes, a spot at base of corium and a much larger one before apex (the last a little excavate anteriorly and posteriorly), spots to connexivum above and beneath, and the legs luteous; a broad annulation to femora before apex and extreme bases of tibiæ black; first joint of rostrum a little longer than the second; antennæ and legs pilose; anterior lobe of pronotum sculptured, posterior lobe granulate, with a distinct central longitudinal impression, lateral angles subprominent; scutellar spine long, slightly ascendant.

Long. 18 millim.; exp. pronot. angl. 5 millim.

*Hab.* Upper Burma: Ruby Mines District (*Col. Bingham*, Brit. Mus.).

*Acanthaspis apicata*, sp. n.

Piceous; a spot at base and a much larger spot near apex of corium, large spots to connexivum (above and beneath), tibiæ, tarsi, and apices of femora luteous; apex of membrane broadly greyish, with a small apical fuscous spot; first joint of rostrum a little longer than the second; anterior lobe of pronotum sculptured, posterior lobe finely granulate, with a narrow central longitudinal impression, lateral angles moderately prominent, their apices a little recurved; scutellar spine long, very slightly ascendant; legs longly pilose; antennæ mutilated.

Long. 17 millim.; exp. pronot. angl. 5 millim.

*Hab.* Brit. India: Utakamand (*Atkinson Coll.*, Brit. Mus.).

*Acanthaspis subrufa*, sp. n.

Black; posterior lobe of pronotum, a large spot before apex of corium (extending from lateral to apical margins), connexivum, rostrum, legs, and lateral margins of abdomen reddish ochraceous; rostrum with the first joint a little longer than the second; anterior pronotal lobe strongly sculptured, posterior lobe with two strong ascendant spines near posterior



margin, and the lateral angles strongly spinously produced, the spines directed a little backward; scutellar spine long, laterally produced; antennæ mutilated.

Long. 17 millim.; exp. pronot. angl. 6 millim.

*Hab.* Brit. India: Bangalore (Atkinson Coll., Brit. Mus.).

*Acanthaspis tavoyana*, sp. n.

Black; head, anterior lobe of pronotum, lateral and posterior margins of pronotum (the last arcuated and inwardly bicurved), lateral margins of corium (widened near base and only extending about two thirds from base), a small spot on apical margin, connexivum, a spot on each side of head beneath behind eyes, and lateral margins of sternum and abdomen dull red; first joint of rostrum a little longer than the second; anterior pronotal lobe strongly sculptured, posterior lobe granulate, the lateral angles spinously produced and directed a little backward; scutellar spines obliquely ascendant.

Long. 19 millim.; exp. pronot. angl. 6 millim.

*Hab.* Pegu: Tavoy (Atkinson Coll., Brit. Mus.).

*Acanthaspis Gregoryi*, sp. n.

Dark opaque fuscous brown; basal joint of antennæ, rostrum, abdomen beneath, and tibiæ castaneous; basal angle of corium and a large rounded spot near centre of its apical margin, spots to connexivum above and beneath (more elongate beneath than above), and the tarsi ochraceous; rostrum with the first joint distinctly shorter than the second; first joint of antennæ much longer than the anteocular portion of head; pronotum with the anterior lobe excavate, the posterior lobe finely rugulose, the lateral angles angularly subprominent; scutellar spine long, only moderately directed upward.

Long. 16 millim.; exp. pronot. angl.  $4\frac{1}{3}$  millim.

*Hab.* Brit. East Africa: Nagalana (*J. W. Gregory*, Brit. Mus.).

*Acanthaspis noctis*, sp. n.

Black, opaque; four small spots to corium (one near base and one near centre of apical margin), large spots to connexivum (above and beneath), luteous; legs castaneous, the extreme apices of femora and bases of tibiæ obscurely luteous; first joint of rostrum slightly shorter than the second; antennæ pilose, first joint about as long as the anteocular portion of head; pronotum with the anterior lobe strongly

excavate, posterior lobe finely granulate, the lateral pronotal angles subspinously prominent; scutellar spine mutilated; anterior tibial furrow occupying about one third of tibial length.

Long. 14 millim.; exp. pronot. angl. 4 millim.

*Hab.* East Africa: Uganda Protectorate (*C. S. Betton*, Brit. Mus.).

Allied to *A. vidua*, Stål, but differing by the more pointed pronotal lateral angles, shorter basal joint of antennæ, differently spotted corium, &c.

*Lencæus Ulysses*, sp. n.

Sanguineous; second joint of antennæ (excluding base), apex of rostrum, eyes, clavus and subclaval streak, apical margin and angle of corium, and membrane black; antennæ pilose, second joint about as long as head; anterior lobe of pronotum somewhat strongly sculptured, posterior lobe finely granulate; rostrum with the first joint shorter, but more than half the length of second.

Long. 14 millim.

*Hab.* Brit. East Africa: Maziwa, Mitatu, and Maungu (*C. S. Betton*, Brit. Mus.).

This is the first Ethiopian species described of a hitherto restricted Oriental genus.

*CASTRUCCIUS*, gen. nov.

Subelongate; head about as long as anterior lobe of pronotum, antecular portion a little longer than postocular portion of head, eyes large and prominent; antennæ pilose, basal joint not quite reaching apex of head; rostrum with the first and second joints thickened and almost subequal in length; pronotum somewhat long, anterior and posterior lobes nearly equal in length, anterior lobe subquadrate, the anterior angles obtusely prominent, posterior lobe widened to lateral angles, which are subprominent, both lobes centrally sulcately excavate, very broadly on posterior lobe; scutellum centrally excavate at base, its apex laterally and posteriorly produced; membrane just passing abdominal apex; connexivum broadly and somewhat upwardly produced; legs short, anterior femora strongly incrassated and finely serrate beneath.

Allied to *Staliastes*.

*Castruccijs insignis*, sp. n.

Black; apex of head, anterior lobe of pronotum, connexivum, rostrum, prosternum, abdomen (excluding apex), femora,

and extreme bases of tibiæ sanguineous ; head in front of eyes excavately striate, behind eyes finely granulate ; anterior lobe of pronotum moderately excavate, posterior lobe finely granulate ; corium and membrane opaque.

Long.  $7\frac{1}{2}$ –8 millim.

*Hab.* North-west Australia : Adelaide River (*J. J. Walker*, Brit. Mus.).

*Tiarodes picturatus*, sp. n.

Head, anterior lobe of pronotum, scutellum; body beneath, rostrum, antennæ, and legs castaneous ; posterior lobe of pronotum, a large marginal spot to corium at apical angle, first three segments of connexivum above and beneath, lateral posterior angles of prosternum, and the tarsi luteous ; head slightly longer than pronotum ; anterior pronotal lobe centrally sulcate, posterior lobe (excluding margins) finely punctate, lateral angles rounded, their margins callous ; femora finely serrate beneath ; tibiæ finely pilose.

Long. 10 millim.

*Hab.* Batchian (*Wallace*, Brit. Mus.).

*HARPACTORINÆ.*

*Velinus pallidus*, sp. n.

Very pale stramineous ; head above from behind antennæ (excluding extreme base), apices of femora, bases of tibiæ, and two spots on connexivum at fourth and fifth segments black ; antennæ black ; biannulations and apex of first joint luteous ; membrane very pale shining ochraceous and passing abdominal apex ; body finely and obscurely pilose, legs more prominently pilose ; first joint of antennæ about as long as head, pronotum, and scutellum together ; anterior pronotal lobe subglobose, profoundly centrally sulcate, posterior lobe with the anterior disk finely and obscurely sulcate ; apices of femora nodulose, the apices of posterior femora more prominently so.

Long. 18 millim. ; exp. pronot. angl. 4 millim.

*Hab.* N.W. Borneo (*R. Everett*, Brit. Mus.).

*Velinus princeps*, sp. n.

Luteous ; head, rostrum, base of first joint and base and apex of second joint of antennæ, a wide transverse basal fascia to pronotum centrally produced to transverse constriction, scutellum, apex of clavus, corium (excluding base), membrane, abdomen above and beneath, posterior angles of prosternum,

lateral areas of meso- and metasterna, trochanters, central and apical annulations to femora, bases of tibiæ, and central annulations to anterior and intermediate tibiæ, bluish black; connexivum with small luteous segmental spots.

*Var.*—Abdomen beneath much suffused with luteous.

First joint of antennæ about as long as head and pronotum together; pronotum centrally longitudinally sulcate, anterior lobe subglobose, posterior angles rounded, subprominent, suberect; lateral margins of corium moderately concavely sinuate; body and legs moderately pilose, apices of the femora nodulose and more prominently pilose.

Long. 20–21 millim.; exp. pronot. angl.  $4\frac{1}{2}$ –5 millim.

*Hab.* Australia: N. and N.W. coast (*Surgeon J. Bynce*, Brit. Mus.).

#### NARSETES, gen. nov.

Head long, about as long as the head and scutellum taken together, postocular portion a little longer than the antocular, rostrum with the second joint very long, about twice as long as first; body depressed, flat; pronotum transversely constricted before middle, anterior lobe centrally sulcate, anterior angles obscurely tuberculous, posterior lobe entire, lateral angles obscurely angulate but non-prominent, posterior margin very slightly sinuate, nearly straight; scutellum unarmed; hemelytra about reaching the apex of the abdomen, membrane nearly twice as long as corium; abdomen on each side moderately dilated and compressed; legs long, tibiæ about as long as femora, posterior tibiæ a little longer; prosternum distinctly sulcated. Antennæ mutilated.

Allied to the genus *Homalosphodrus*; differs by structure of rostrum &c.

#### *Narsetes longinus*, sp. n.

Black, shining; posterior lobe of pronotum and corium either ochraceous or greyish white; margins of abdomen above and beneath luteous or ochraceous, sometimes spotted with black; clavus (excluding basal area) piceous; body and legs moderately pilose, the lateral margins of head and the legs longly pilose. Antennæ mutilated.

Long. 25 millim.

*Hab.* Cambodia (Brit. Mus.). India: Khási Hills (Coll. Dist.).



*Arcesius annulatus*, sp. n.

Head, pronotum, rostrum, and antennæ luteous; head behind eyes (not reaching base), base and apex of first antennal joint, whole of second joint and extreme apex of third, and the basal joint of rostrum black, between antennæ and eyes the head is brownish ochraceous; scutellum ochraceous, black at apex; corium purplish brown; membrane dull ochraceous; body beneath dull ochraceous; sternum brownish ochraceous; legs black; coxæ, anterior femora beneath (excluding apex), a subapical annulation to intermediate femora, biannulations to posterior femora, and about apical halves of tibiæ luteous or ochraceous. Head about as long or very slightly longer than pronotum; first joint of antennæ about as long as head and anterior pronotal lobe together; legs longly pilose; posterior pronotal lobe with two discal obtuse tuberculous spines.

Long., ♂ 20 millim.

*Hab.* New Guinea (*Wallace*, Brit. Mus.).

*Agriolestes melanopterus*, sp. n.

Black, shining; basal joint of rostrum, head beneath and lateral margins in front of eyes, anterior lobe of pronotum (excepting black reticulate markings), subapical annulation to femora, underside of basal half of anterior femora, coxæ, trochanters, apex of abdomen, and the last two segments of connexivum ochraceous or reddish ochraceous. Body and legs pilose; first joint of antennæ about as long as head, the ante- and postocular portions of which are about equal in length; abdomen on each side moderately and somewhat lobately dilated.

Long. 28 millim.

*Hab.* Upper Burma (*Col. Bingham*, Brit. Mus.).

*Ricolla femoralis*, sp. n.

Brownish ochraceous; abdomen beneath ochraceous; antennæ, antennal spines to head, spines to pronotum, abdominal marginal spines, and legs black; bases of femora stramineous, apices of femora, bases of tibiæ, and head reddish ochraceous; central carina and apex of scutellum dull ochraceous; veins to corium greyish white; basal joint of antennæ about as long as posterior femora; spines at base of antennæ long, divergent; anterior lobe of pronotum centrally deeply sulcate;

posterior lobe with four long spines (two forming the lateral angles and two discal and erect); abdominal lateral spines moderately long and prominent; a central fascia to sternum and the disk of abdomen beneath stramineous.

Long. 16 millim.

*Hab.* Amazons: Ega (*Bates*, Brit. Mus.).

*Ricolla jamaicensis*, sp. n.

Luteous; spines to posterior lobe of pronotum, clavus, base and apical angular area (connected inwardly) of corium, membrane (excluding apex), and extreme apices of femora carmine-red; antennæ with the apices of first and second joints piceous; apex of abdomen sometimes piceous. Abdominal marginal spines very long and strong; head about as long as pronotum, with a long spine on each side at base of antennæ; posterior lobe of pronotum with four long spines (two forming the lateral angles and two discal); spines at apices of anterior femora distinct; membrane passing the abdominal apex.

Long. 14–15 millim.

*Hab.* Jamaica (*P. H. Gosse*, Brit. Mus.).

*Endochus modestus*, sp. n.

Pale brownish ochraceous, sparingly greyishly pubescent; apices of femora and tibiæ fuscous, anterior femora with fuscous longitudinal lateral lines; abdomen beneath and legs pale ochraceous; head with a prominent spine at base of each antenna, transversely impressed between eyes; pronotum with two small piceous spines near posterior margin of anterior lobe, posterior lobe with two long discal spines between the lateral angles, which are also longly laterally spinous; abdomen elongate and attenuated; membrane with a shining greenish tint, not reaching apex of abdomen; first joint of antennæ about as long as head, pronotum, and scutellum together.

Long. 10 millim.

*Hab.* North-west Australia: Adelaide River (*J. J. Walker*, Brit. Mus.).

*Domnus coloratus*, sp. n.

Head black; antennæ and rostrum ochraceous; bases and apices of first and second joints of antennæ and extreme apex of first joint of rostrum black; pronotum, sternum, scutellum, membrane, abdomen beneath, and legs pale purplish brown;

abdomen with a double discal series and a submarginal series of ochraceous spots; tibiæ castaneous; corium stramineous, its apical area infuscated; connexivum above and beneath luteous, spotted with black. Head very slightly shorter than pronotum, the postocular portion longer than antecular portion; body sparingly pilose; pronotum unarmed, posterior lobe finely rugulose, lateral angles rounded, subprominent; rostrum with the first joint about half as long as second; first joint of antennæ a little longer than head; lateral margins of abdomen moderately dilated, fourth and fifth segments somewhat lobately produced.

Long. 22 millim.

*Hab.* Brit. East Africa: Samburu (*C. S. Betton*, Brit. Mus.).

*Margasus luridus*, sp. n.

Black; corium piceous, with the clavus and a connected very broad subclaval fascia stramineous; head, rostrum, and legs ochraceous; antennæ, a large spot behind eyes, and a spot on upper surface of anterior and intermediate femora a little beyond middle black; membrane shining bronzy, its apex pale hyaline; lateral margins of meso- and metasterna stramineous; ante- and postocular portions of head almost equal in length; first joint of antennæ nearly as long as head and pronotum together; anterior lobe of pronotum with two long discal conical spines, the anterior angles tuberculously subprominent, posterior lobe with the lateral angles spinously produced and with two long discal conical spines; lateral abdominal margins amplified.

Long. 22 millim.; exp. pronot. angl.  $6\frac{1}{2}$  millim.

*Hab.* Madagascar: Fort Dauphin (*Cloisel*, Brit. Mus.).

Allied to *M. femoralis*, Sign.

*Paloptus papuensis*, sp. n.

Head, rostrum, scutellum, and corium pale reddish ochraceous, the anterior pronotal lobe and the corium a little paler in hue; antennæ, second and third joints of rostrum, connexivum, legs, and abdomen beneath black; lateral margins of connexivum (excluding central angle) above and beneath luteous; base of first joint of antennæ reddish ochraceous; basal joint of antennæ about as long as head and pronotum together; anterior lobe of pronotum centrally sulcate, posterior lobe with four long spines (two forming the lateral angles, the other two erect and discal near posterior margin); scutellum tuberculously tumid, its apex pale luteous, laterally

spinously produced; connexivum centrally prominently angularly amplified; membrane considerably passing the abdominal apex.

Long.  $12\frac{1}{2}$ –13 millim.

*Hab.* New Guinea (*Wallace*, Brit. Mus.).

*Paloptus sulphurellus*, sp. n.

Luteous; antennæ, apices of anterior and intermediate femora, apical halves of posterior femora, and apex of scutellum black; basal joint of antennæ as long as head and pronotum; head a little shorter than pronotum; anterior pronotal lobe sculptured, longitudinally impressed, posterior lobe with four long spines (two forming the lateral angles and two erect, discal) near posterior margin; abdomen moderately angularly amplified at lateral margins of fourth and fifth abdominal segments.

Long.  $12\frac{1}{2}$  millim.

*Hab.* New Guinea (*Wallace*, Brit. Mus.).

*Paloptus molochinus*, sp. n.

Dull ochraceous; apices of the femora and the abdomen beneath piceous; lateral margins of the abdomen luteous; antennæ reddish ochraceous, apex of the first joint and the whole of the remaining joints fuscous. Basal joint of antennæ about as long as head and pronotum together; anterior lobe of pronotum sculptured, centrally sulcate, posterior lobe smooth, with four long spines (two long, forming the lateral spines, and two erect, discal) near posterior margin; scutellum posteriorly, laterally, spinously produced; fourth to fifth abdominal segments angularly dilated at lateral margins.

Long. 13 millim.

*Hab.* Malayan Archipelago: Waigiou (*Wallace*, Brit. Mus.).

*Pristhesancus variabilis*, sp. n.

Ochraceous; head, basal joint of rostrum, and legs (excluding coxæ and trochanters) black; first joint of antennæ and rostrum (excluding basal joint) castaneous; apex of first joint of antennæ and the remaining joints piceous; membrane shining ochraceous.

*Var.*—Apex of head, basal joint of rostrum, and bases of femora ochraceous; clavus, apical angles of corium, and sternum piceous; basal joint of antennæ about as long as head, pronotum, and scutellum; anterior lobe of pronotum with two rather long conical spines, posterior lobe with the



lateral angles conically spinous and directed outwardly; scutellum with a long conical spine near base, the apex also shortly conically spinous; membrane considerably passing the abdominal apex.

Long. 17 millim.

*Hab.* New Guinea: Dorey (*Wallace*, Brit. Mus.).

*Pristhesancus nigroannulatus*, sp. n.

Ochraceous; femora with a broad black central annulation, bases of femora stramineous; basal joint of antennæ about as long as the posterior femora; postocular portion of head considerably longer than anterior portion; anterior pronotal lobe with two divergent conical spines, posterior lateral angles laterally conically produced; scutellum with a long semierect discal conical spine, the apex terminating in a much smaller and more lateral spine; membrane considerably passing the abdominal apex.

Long. incl. membr. 18 millim.; exp. pronot. angl.  $4\frac{1}{2}$  millim.

*Hab.* New Guinea (*Wallace*, Brit. Mus.).

*Pristhesancus uniformis*, sp. n.

Pale ochraceous; head, rostrum, pronotum, and sternum brownish ochraceous; first joint of antennæ about as long as head and anterior pronotal lobe together; head with the postocular area considerably longer than the anteocular; anterior pronotal lobe with the anterior angles tuberculously prominent and with two long erect conical spines, lateral and posterior angles tuberculously spinously produced; scutellum with a long discal conical spine; body somewhat strongly pilose.

Long. 24 millim.; exp. pronot. angl.  $7\frac{1}{2}$  millim.

*Hab.* Australia: Queensland (*Het*, Brit. Mus.).

Allied to *P. melitus*, Dist.

*Helonotus nigrinus*, sp. n.

Head, antennæ, rostrum, pronotum, scutellum, and legs black; corium and sternum purplish brown; membrane and abdomen beneath ochraceous; greyishly pilose, especially on the pronotum and sternum; first joint of the antennæ about as long as head, pronotum, and scutellum together; anterior lobe of pronotum with two long discal spines, posterior lobe with two shorter discal spines, lateral angles acutely conically produced, their apices directed slightly upward and backward; membrane about reaching the apex of the abdomen.

Long. 18 millim.; exp. pronot. angl.  $4\frac{1}{2}$  millim.

*Hab.* Malayan Archipelago: Gilolo (*Wallace*, Brit. Mus.).

*Helonotus malayanus*, sp. n.

Ochraceous; head, antennæ, rostrum, and anterior pronotal lobe reddish ochraceous; legs black, apices of femora and the whole of the tibiæ and tarsi ochraceous; membrane very pale ochraceous, about reaching the apex of the abdomen; connexivum black, its lateral margin luteous; first joint of antennæ about as long as head and pronotum together; anterior lobe of pronotum with two long discal spines, posterior lobe with two shorter discal spines; lateral angles conically spinously produced.

A somewhat variable species, the abdomen sometimes darkly tomentose and the posterior margin of the apical segment somewhat broadly black.

Long. 18–19 millim.; exp. pronot. angl.  $4\frac{1}{2}$  millim.

*Hab.* Sumatra: Macassar, Waigiou (*Wallace*, Brit. Mus.).

*Helonotus confusus*, sp. n.

Closely allied to the preceding species (*H. malayanus*), but differing in the following respects:—The first joint of the antennæ is longer and is about as long as head, pronotum, and scutellum together; head in front of eyes black; legs castaneous, the apices of the femora black; connexivum ochraceous, spotted with black.

Long. 18 millim.; exp. pronot. angl.  $4\frac{1}{2}$  millim.

*Hab.* Malayan Archipelago: Batchian (*Wallace*, Brit. Mus.).

## CERELLIUS, gen. nov.

Body elongate; head as long as pronotum, anteocular about as long as postocular portion, the last somewhat attenuated towards base, widest and most robust between antennæ and eyes, strongly transversely constricted between eyes; antennæ long, first and second joints almost subequal in length; rostrum with the first joint little more than half the length of second; pronotum strongly transversely constricted, the anterior lobe subglobose, centrally finely sulcate, posterior lobe broadly sulcate anteriorly, its lateral angles subprominent and rounded, its base inwardly sinuate; scutellum subconically tuberculous near base and at apex, between which it is much deflected; membrane about reaching abdominal apex; abdomen upwardly dilated at each lateral margin; legs long, anterior femora not prominently incrassate, femora and tibiæ about equal in length, intermediate tibiæ very slightly curved.

By the peculiar structure of the scutellum I place this genus near *Helonotus*; in other superficial appearances it somewhat resembles *Velinus*.

*Cerellius typicus*, sp. n.

Luteous; anterior pronotal spines, lateral margins of posterior pronotal lobe, scutellum, and femora stramineous; antennæ, a spot near base of head, apex of rostrum, a transverse spot at each lateral angle of pronotum connected by an arcuated line, an angulated spot at base of scutellum, transverse spots to connexivum at segmental incisures both above and beneath, biannulations and apices of femora, a spot near each coxa, a spot at lateral angles of prosternum, and a lateral segmental series of spots to abdomen black; tibiæ castaneous, their bases black, followed by a stramineous annulation, tarsi castaneous; posterior margin of pronotum angularly sinuate before base of scutellum.

Var. *a*.—The black spots at lateral angles of pronotum arcuately connected posteriorly as well as anteriorly.

Long. 14 millim.

*Hab.* Madagascar (*Cloisel*, Brit. Mus.); Fianarosta (Coll. Dist.).

*Cerellius nigricans*, sp. n.

Pale reddish ochraceous; head, antennæ, anterior lobe of pronotum, lateral angles of posterior pronotal lobe (arcuately connected posteriorly and anteriorly), base of scutellum, transverse spots to connexivum at segmental incisures both above and beneath, lateral marginal areas of sternum, a spot at lateral angles of prosternum, disk of abdomen, and legs black; apex of head above, central area of head beneath, margins of posterior lobe of pronotum, scutellum (excluding base), acetabula, coxæ, trochanters, bases of femora, a sub-basal annulation to tibiæ, and some discal spots to abdomen beneath luteous; rostrum with the basal joint ochraceous, remaining joints piceous.

Differs from the preceding species (*S. typicus*), apart from the considerable colour-differences, by having the posterior margin of the pronotum moderately concavely and not angularly sinuate.

Long. 12 millim.

*Hab.* Madagascar (*Shaw*, Brit. Mus.).

*Sindala purpurascens*, sp. n.

Purplish brown; head and connexivum black; marginal

spots to connexivum at second, third, fourth, and fifth segments, and intermediate and posterior legs ochraceous; anterior tibiæ, bases and apices of intermediate and posterior tibiæ, and apices of the tarsi black; first joint of antennæ brownish ochraceous, its base and apex and the whole of the remaining joints piceous; rostrum brownish ochraceous, its first joint piceous; membrane pale bronzy. Spines of head and anterior femora arranged as in *S. granuligera*, Stål, from which it differs, apart from the very different coloration, by the shorter head, distinctly shorter than the pronotum.

Long.  $11\frac{1}{2}$  millim.

*Hab.* Brazil: Petropolis (*H. Clark*, Brit. Mus.).

*Scipinia arenacea*, sp. n.

Dull sanguineous; head, antennæ, anterior lobe of pronotum, scutellum, clavus, apex of rostrum, and disks of meso- and metasterna black; head beneath, eyes, apical margin of scutellum, and abdomen beneath ochraceous; legs brownish ochraceous; membrane dark bronzy. Head armed with six spines, arranged in pairs from eyes to base of antennæ, behind eyes to base a series of discal and lateral spines mostly shorter, a prominent spine at base of antennæ; pronotum with a broad central depression, the area of the lateral angles also depressed, anterior lobe tuberculous or spinous, with four prominent discal spines arranged in pairs, posterior lobe rugulose granulate, posterior margin distinctly a little notched near each posterior angle, lateral angles subprominently angulate; anterior femora strongly nodulose, intermediate and posterior femora obscurely nodulose.

Long. 11–12 millim.; exp. pronot. angl. 3 millim.

*Hab.* Australia: Queensland (Brit. Mus.).

*Irantha doreyana*, sp. n.

Ochraceous; posterior lobe of pronotum and margins and apex of scutellum stramineous; antennæ with the first joint ochraceous, remaining joints piceous; head above with six long spines arranged in pairs (two behind base of antennæ, two between and two behind eyes); first joint of rostrum considerably passing the region of the eyes; first joint of antennæ about as long as head and anterior lobe of pronotum; pronotum with the anterior lobe tuberculously rugose and with two conical spines near its anterior margin, posterior lobe finely granulate, the lateral angles spinously produced and directed backward, posterior angles subprominent; femora nodulose, anterior femora nodose, with a very long



spine on their upper surface near apex and with four shorter spines arranged in pairs beneath.

Long. 7 millim.; exp. pronot. angl. 3 millim.

*Hab.* Dorey (Wallace, Brit. Mus.).

*NABINÆ.*

*Nabis subcoleoptratus.*

*Nabis subcoleoptratus*, Kirby, in Rich. Faun. Bor.-Amer. iv. p. 282 (1837).

*Nabis xanthopus*, MSS., Walk. Cat. Het. vii. p. 143. 22 (1873).

XLVII.—*New Generic Names for some Entomostraca and Cirripedia.* By Canon A. M. NORMAN, F.R.S. &c.

In preparing for publication a second edition of the Catalogue of the Crustacea in my collection and tracing the generic names of the lower orders in that class I find that the following changes are necessary.

CLADOCERA.

Genus SIMOSA \*, nov. nom.

= *Simocephalus*, Schœdler.

Two genera named *Simocephalus* were published almost simultaneously. The name was used for a genus of snakes by Dr. Günther in his 'Catalogue of Columbrine Snakes,' the exact date of the publication of which, I learn from him, was October 9, 1858; and the name was applied to a genus of Cladocera by Schœdler in a paper read September 22, 1858, and as it was illustrated by a quarto plate, it is not likely that it could have been published within so short a time after the reading as October 9.

Genus RHYNCHOTALONA †, nov. nom.

In 1861 G. O. Sars instituted a genus *Harporhynchus* for the interesting species he was describing—*H. falcatus*; but that name having been previously (in 1848) employed by Cabanis for a genus of birds, in 1884 C. L. Herrick substituted the name *Leptorhynchus*—a still more unfortunate choice, for that name had been employed at least three times previously, and it is therefore necessary to supersede it.

\* σιμός, snub-nosed.

† ῥυγχωτός, having a beak.

# COPEPODA.

## HALICYCLOPS\*, nov. nom.

In 1893 Claus instituted a genus *Hemicyclops* with the type *Cyclops æquoreus*, Fischer; but the name had been previously used in a different sense by Boeck in 1872.

## Genus EUTERPINA, nov. nom.

In 1873 Claus employed the name *Euterge* for a genus of marine Copepoda with the type *E. gracilis*; but that generic name was preoccupied by Swainson (1831) among the Lepidoptera.

## Genus TEGASTES†, nov. nom.

I propose this name as a substitute for *Amymone*, Claus, 1860, type *A. satyrus*, Claus, since *Amymone* was not only a name given in 1785 to a larval form by O. F. Müller, of which Claus was aware when he instituted his genus, but was employed by Savigny in 1817 for a genus of Annelids.

## Genus DACTYLOPUSIA, nov. nom.

*Dactylopus* is in use for a genus of fishes thus named by Gill in 1859, and therefore it is necessary that the same name applied to a genus of Copepods by Claus in 1862 should be changed. Type *D. Stræmii* (Baird).

## CLAUSIDIUM, Kossman, 1874.

This name must be employed instead of *Hersilia*, Philippi, a name preoccupied by Savigny in Arachnida and by Dejean in 1834 for a genus of Coleoptera.

## Genus PHYLLOTHYREUS‡, nov. nom.

Instead of *Phyllophora*, H. Milne-Edwards, a name which had been three times earlier employed. The type is *Phyllothureus cornutus* (H. Milne-Edwards). I may take this opportunity of announcing this interesting species as a member of the British fauna. It has been known to me for more than forty years. It was sent to me by William Laughrin at a

\* ἄλς, the sea.

† τεγαστής for στεγαστής, like τέγος for στέγος, one who covers up (*Stegastes* already in use).

‡ φύλλον, a leaf; θυρεός, an oblong shield.

time when I was employing that old coastguardsman to collect fish-parasites for me. He said that he had found it on the blue shark at Polperro.

The two Cornish specimens agree in every particular with Milne-Edwards's description and capital figures (Hist. des Crust. vol. iii. p. 472, pl. xxxviii. figs. 13, 14). I am not aware that the species has been recorded by any other author; and the type specimen was from near Tongatubu, Friendly Islands!

#### CONGERICOLA, J. van Beneden.

This name must be used with van Beneden's type *C. pallida*. The earlier name *Cycnus*, H. Milne-Edwards, 1840, had been preoccupied by Hübner, 1816, for a genus of Lepidoptera.

#### CIRRIPEDIA.

##### Genus TRYPETESA \*, nov. nom.

Type *Trypetesa (Alcippe) lampas* (A. Hancock).

Unfortunately the name *Alcippe*, which Hancock gave to this very interesting burrowing *Lepas* found off the North-umberland coast by him, was preoccupied by Blyth in 1844, and is in use for a genus of birds. The genus *Alcippe*, Hancock, is not to be found in either Scudder or Waterhouse and Sharp. In Scudder, moreover, *Alcippe*, Blyth, did not appear; and it was no doubt in consequence of this that a third genus *Alcippe* was instituted in 1896 among insects.

#### XLVIII.—British Land Isopoda.—Supplement.

By Canon A. M. NORMAN, F.R.S. &c.

IN the 'Annals' for January 1899 (ser. 7, vol. iii. p. 70) I published a paper containing notes on all the Land Isopoda known to belong to our fauna up to that date. Three species have since been added, which I will now notice, with some other brief remarks.

##### Genus TRICHONISCUS, Brandt.

*Trichoniscus vividus* (Koch).

Dr. Scharff has recorded this species from Cappagh, Co.

\* τροπητής, a borer. I have used this particular ending because *Trypetes* and *Trypeta* are already in use.

Waterford ('Irish Naturalist,' vol. ix. p. 158), and has kindly sent me specimens from another locality, viz. Borris, Co. Carlow. It has not as yet been found in England.

### Genus HAPLOPHTHALMUS, Schöbl.

#### *Haplophthalmus Mengii* (Zaddach).

1844. *Itea Mengii*, Zaddach, Synops. Crust. Prussic. Prodrum, p. 16.

1860. *Haplophthalmus elegans*, Schöbl, Zeits. f. wiss. Zool. vol. x. p. 449.

1885. *Haplophthalmus Mengii*, Budde-Lund, Crust. Isop. Terrestria, p. 250.

1898. *Haplophthalmus Mengii*, G. O. Sars, Account of Crustacea of Norway, vol. ii. Isopoda, p. 167, pl. lxxiv. fig. 1.

I found two specimens of this small but most strongly characterized addition to our fauna in 1900 at Corcumroe Abbey, Co. Clare, Ireland. The abbey is a ruin and in a most lonely spot. The *Haplophthalmi* were met with under a piece of moss growing on an old tombstone. I was very anxious to find more, but a long search produced no further specimens.

### Genus PORCELLIO, Latreille.

#### *Porcellio Ratzeburgii*, Brandt.

1833. *Porcellio Ratzeburgi*, J. F. Brandt, Conspectus Monog. Crust. Oniscodorum Latreillii, p. 13.

1885. *Porcellio Ratzeburgii*, Budde-Lund, Crust. Isop. Terrest. p. 83.

1898. *Porcellio Ratzeburgi*, G. O. Sars, Crust. Norway Isopoda, p. 182, pl. lxxx. fig. 1.

It is also *P. nemorosus*, Koch, *P. quercuum*, Schnitzer, and probably *P. lugubris*, Koch.

In 1899 Mr. W. M. Webb sent me some specimens of this species from Essex to determine. They were only young examples, but seemed clearly referable to *P. Ratzeburgii* (see Webb, 'Essex Naturalist,' vol. xi. 1899, p. 127). I have taken the species commonly in the Tyrol, at Trafoi, St. Martini, and Capitello.

#### *Porcellio dilatatus*, Brandt.

I have found this species at Berkhamsted, Herts. In Ireland Dr. Scharff has recorded it from Dundrum, and Mr. C. W. Buckle writes respecting it ('Irish Naturalist,' vol. xi. 1902, p. 43):—"Occurs abundantly in outhouses in Antrim Road, Belfast." He says that he has also received it from near Dunmurray, Co. Antrim, and adds, "I have also taken it near Chichester, Sussex."



## Genus ARMADILLIDIUM, Brandt.

*Armadillidium vulgare* (Latreille).

Dr. Scharff, in his paper on "The Irish Woodlice" ('Irish Naturalist,' vol. iii. 1894), wrote of this species:—"In Ireland it is more common in the plains than in the mountains, and it has not been taken on the west coast." Remembering this, when in Galway in 1900 I sought for the species wherever I was, but saw nothing of it in the north; but in the south of the county I met with it in some numbers at Ardahan.

*Armadillidium pulchellum*, Zencker.

—? *Oniscus pulchellus* (Zencker), Panzer, Heft 62. 21 (*vide* Budde-Lund).

1833. *Armadillidium pulchellum*, J. F. Brandt, Conspectus Monog. Crust. Onisc. Latr. p. 26.

1885. *Armadillidium pulchellum*, Budde-Lund, Crust. Isop. Terrest. p. 70.

1892. *Armadillidium pulchellum*, A. Dollfus, "Tableaux synoptiques de la Faune Française: Le genre *Armadillidium*," Feuille des Jeunes Naturalistes, iii. série, 1892, p. 14 (separate copy) and woodcuts.

1898. *Armadillidium pulchellum*, G. O. Sars, Crust. Norway Isop. p. 191, pl. lxxxiii. fig. 4.

1900. *Armadillidium pulchellum*, Scharff, Irish Naturalist, vol. x. p. 109.

This is the third addition to our fauna made since my previous paper was published. I have received from Dr. Scharff specimens which were found at Sligo.

Dr. Kinahan, in his first paper on the British Land Isopoda (Nat. Hist. Review, vol. iv. 1857, p. 258), mentioned that twelve out of the fourteen species he then recorded had been found in his garden, not 60 yards square, at Dublin. Gardens, in fact, are especially favourable hunting-grounds for woodlice. In my own here, and even in the part nearest to my house (separated by a fence from a farther garden), which is of about an acre in extent, I have found ten species. It may be of interest to note the woodlice found under similar circumstances by Dr. Kinahan and myself. I use present nomenclature and place the names employed by Dr. Kinahan in brackets.

Garden at Dublin (Dr. Kinahan's):—*Trichoniscus pusillus* (*Philourgria celer*); *Oniscus asellus* (*O. murarius* and *fossor*); *Philoscia muscorum*; *Metoponorthus pruinus* (*Porcellio pruinus*); *Metoponorthus cingendus* (*Porcellio cingendus*); *Porcellio scaber*, *lævis*, *pictus*, and *dilatatus*; *Cylisticus conexus* (*Porcellio armadilloides*); *Armadillidium vulgare*.

Garden, Red House, Berkhamsted, Herts:—*Haplophthalmus danicus*; *Trichoniscus pusillus* and *roseus*; *Oniscus asellus*; *Philoscia muscorum*; *Platyarthrus Hoffmanseggii*; *Metoponorthus pruinus*; *Porcellio scaber*; *Cylisticus convexus*; *Armadillidium vulgare*.

In my former paper at the bottom of p. 75—in consequence of a wandering mind, I suppose—the word "*Porcellidium*" is substituted for *Armadillidium*.

XLIX.—On the Skeleton and Systematic Position of  
*Luvarus imperialis*. By C. TATE REGAN, B.A.

In a recent paper\* I pointed out numerous resemblances between *Luvarus imperialis* and the Acanthuridæ. About a month previously Mr. E. R. Waite† had published in Australia an account of the skeleton of a large specimen stranded at Bermagui, New South Wales—a fact of which I could not have been aware when my own paper was written. I have now had an opportunity of examining the skeleton of one of these fishes taken in September last near St. Martin's Point, Guernsey, and as a result I find that *Luvarus* must be considered to be a most abnormal and specialized Scombroïd, and that the features in which it approaches the Acanthuridæ—the most notable of which are the restricted gill-openings, united pelvic bones, small number of vertebrae, short first vertebra, and maxillaries attached to the non-protractile premaxillaries, as well as the correspondence in the visceral anatomy—are to be regarded as the result of convergence. Examination of a large and considerably damaged specimen previously led me to believe that the palatines lacked the posterior (prefrontal) articulation; but in this I was evidently mistaken.

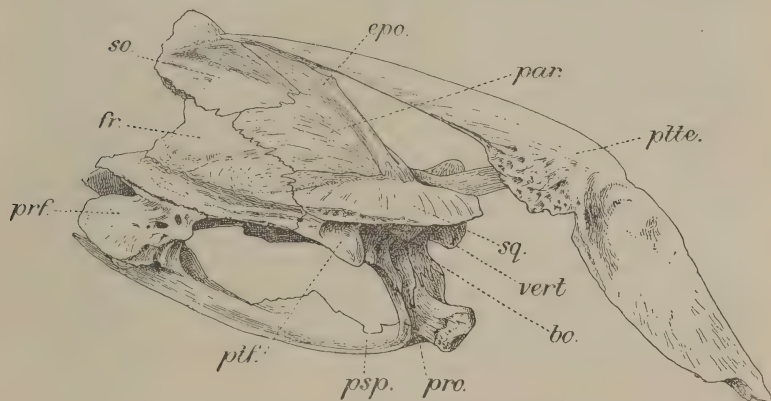
In the skeleton now dealt with the anterior part of the skull has been considerably injured; in other respects it is very complete. Mr. Boulenger has pointed out to me that the Scombridæ and Xiphiidæ are remarkable in that the deeply forked bases of the rays of the caudal fin are inserted nearly vertically and extend over the hypural so as to almost entirely conceal that bone, those of the upper and lower series nearly meeting in the middle line on each side. This

\* Ann. & Mag. Nat. Hist. (7) x. 1902, p. 278.

† Rec. Austral. Mus. iv. 1902, p. 292.

feature is also seen in *Luvarus*, and is well illustrated in Mr. Waite's photograph. In the Scombridæ the vertebræ of the caudal peduncle are square and have broad flat neural and hæmal spines, which are directed horizontally backwards, so as to embrace the succeeding vertebræ above and below, and the vertebræ between the procurent caudal rays are greatly and progressively shortened. A similar condition obtains in *Luvarus*, in which, however, the first vertebra of the caudal peduncle is only half as long as the one preceding it, but otherwise normal; it is succeeded by two square vertebræ, as in the Scombridæ, and between the last of these and the hypural there is an extremely short vertebra. The sessile blade-like ribs exactly resemble the sessile anterior ribs of a *Thunnus*; epipleurals are absent.

The pectoral arch is remarkable for the large size of the post-temporal and for the fact that there is no supra-clavicle, which may be regarded as having disappeared or as being



Greater part of Skull of *Luvarus imperialis*.

*so.*, supra-occipital; *epo.*, epiotic; *ptte.*, post-temporal; *par.*, parietal; *sq.*, squamosal; *fr.*, frontal; *prf.*, prefrontal; *ptf.*, postfrontal; *psp.*, parasphenoid; *pro.*, prootic; *bo.*, basioccipital; *vert.*, centrum of first vertebra.

represented by the lower part of the post-temporal. The post-clavicle is small, the clavicle, scapula, coracoid, and pterygials exactly like those of *Thunnus*. The pelvic bones are completely united, but do not diverge posteriorly at the vent, as has been erroneously stated. The vent is surrounded by a cartilaginous ring, to which is joined the pelvis anteriorly and the bone formed by the united anterior interhæmals

posteriorly. In the skull, which is best understood by comparison with that of a *Thunnus*, the ossified sclerotic and broad opercular bones are typically Scombroïd features. In a *Thunnus* the roof of the skull is composed of a posterior, short, nearly vertical portion, formed to a great extent by the exoccipitals, and above them by the supra-occipital and epiotics, and of an anterior, long, nearly horizontal portion, mainly formed by the frontals, and behind them by squamosals, parietals, epiotics, and supra-occipital. The upper forks of the post-temporals are attached to the epiotics, which almost meet in the middle line, the posterior part of the supra-occipital being very narrow; the frontals only meet in the middle line posteriorly, anteriorly they bound a cavity in front of the brain-cavity, open above, the floor of which is formed by the ethmoid, and which is filled with a loose oily tissue. The skull of *Luvarus* may be regarded as that of a *Thunnus* in which the posterior, nearly vertical part of the roof has become very long and oblique, the epiotics being greatly enlarged and united in the middle line behind the supra-occipital, whilst this latter bone is carried forwards to the level of the prefrontals and forms the roof of the cavity between the frontals, which is extremely large and is open anteriorly, its floor now being formed mainly by the united alisphenoids and prefrontals. From Mr. Waite's figure it would appear that ethmoid and supra-occipital are connected. The posterior part of the skull below is remarkable for its extreme shortness and great depth.

In conclusion, I must express my thanks to Mr. A. Collenette, Hon. Curator of the Guernsey Museum, and to Mr. E. Gerrard, by whose courtesy I have been enabled to examine this skeleton.

L.—On a new Species of Cat from China.

By J. LEWIS BONHOTE, M.A.

IN working out some of the small spotted cats of China I find the following species to be undescribed, and I propose for it the name

*Felis Ricketti*, sp. n.

Intermediate in size between *F. euphilura* and *F. chinensis*. General ground-colour bluish grey, except across the shoulders, where rufous tips to the hairs predominate. White



stripes in front of the eye conspicuous but short, losing themselves before reaching level of the ear. Starting from the outer margin of these stripes on either side a black stripe runs backwards, which broadens out considerably behind the ear, gradually becoming rufous at the base of the neck, and ending abruptly over the shoulders. The black inner margins to the white eye-stripe remain narrow and, becoming more or less suffused with rufous over the shoulders, may still be traced, although very much broken up, as far as the hind-quarters. The remainder of the upper parts are covered with elongated spots of rufous with or without black centres, those on the limbs showing most black. Underparts white, with a row of clear-cut black spots on either side of the ventral median line. Across the lower part of the neck are three or four irregular black collars, much broken up and suffused with rufous. The tail is light grey in colour, annulated with black, the annulations being about equal in breadth to the spaces between them. The outer sides of the ears are black, with a small patch of white.

The *skull* is large and strongly built, but, except in size, does not differ appreciably from that of *F. chinensis*.

Dimensions (from dried skin) :—Head and body 26 inches ; tail 11.

Skull (see below).

*Hab.* Foochow, China.

*Type.* B.M. 98. 6. 21. 1. Collected by C. B. Rickett, Esq., on the 5th April, 1898.

There are two other specimens in the Museum, one from Ningpo and the other from Corea. This species is nearly allied to *F. euphilura*, of which the British Museum has specimens from Amurland and Corea. *F. euphilura* is, however, a much larger cat with long fur and a thick bushy tail. It has hardly any markings except on the head ; there is a slightly darker area along the middle of the back and a few faint rufous spots may be traced on the flanks, limbs, and tail. On the underside, except for some broken rufous collars on the throat, there are no distinct markings, the general colour being pale buff ; in specimens from Corea the markings are more distinctly visible.

In the general tone of its colour *F. Ricketti* is not unlike *F. tristis*, especially resembling it in the predominance of the rufous tint over the shoulders and the blue-grey colour of the rest of the body. *F. tristis*, however, is much larger and its markings are broad, irregular, light patches with dark edgings, resembling in shape those of *F. marmorata* ; whereas in the present species the markings are in the shape of spots, and

where there is a differentiation of colour the dark part lies in the centre. One other species, *F. chinensis*, has to be taken into account; but apart from size, for it is smaller, *F. chinensis* may be distinguished by the ground-colour being buff, not grey; the shoulders are not noticeably more rufous than the rest of the body, and the spots are much smaller and more cleanly cut.

I append the measurements of the skulls of *F. euptilura*, *F. Ricketti*, and *F. chinensis*.

	Greatest length. mm.	Basal length. mm.	Palatal length. mm.	Zygomatic breadth. mm.	Greatest breadth of brain- case. mm.	Breadth between inner roots of car- nassials. mm.	Length of car- nassials. mm.
<i>F. euptilura</i> , Ell. { B.M. 95.2.21.1. {	110	90	39	70	47	27	11
<i>F. Ricketti</i> . B.M. 98.6.21.1. {	105	88	39	69	44	25	10.5
<i>F. chinensis</i> . B.M. 2.6.10.9. {	88 approx.	75	35	60	42	22	10

## LI.—*New Mammals from Chiriqui.*

By OLDFIELD THOMAS.

A FURTHER collection received from Mr. H. J. Watson, of Boquete, Chiriqui, contains, besides examples of almost all the species described from that locality by Mr. Outram Bangs, specimens of the following new forms:—

### *Cebus imitator*, sp. n.

Like *C. hypoleucus*, but the female with elongated frontal tufts.

Speaking first of the female only it may be described as follows:—

Size and colour in all respects as in *C. hypoleucus*, except on the frontal region, where, as in certain of the South-American species, the hairs are elongated to form prominent frontal tufts which entirely alter the appearance of the face. These hairs are about 40 mm. in length, and are therefore very different from the short hairs covering the frontals in *C. hypoleucus*; they are also of a distinctly brownish tinge, markedly different from the white of the cheeks and throat. White fur on and surrounding the ears longer than in *C. hypoleucus*—indeed the fur throughout, on body, limbs,

and tail, is slightly longer and more woolly than is usual in *C. hypoleucus*.

Skull and dentition as in the allied form.

Dimensions of the type (measured in the flesh) :—

Head and body 450 millim.; tail 510; hind foot 123.

Skull: greatest length 91, basal length 64·5; length of upper cheek-teeth 22·3.

*Hab.* Boquete, 4000 feet.

*Type.* Adult female. B.M. no. 3. 3. 3. 13. Original number 113. Collected 15th October, 1902.

Such are the characters of two female specimens, and I have no hesitation in saying that they cannot be referred to *C. hypoleucus*, the only *Cebus* hitherto recognized in Central America, much as they resemble it. The British Museum possesses a number of examples of both sexes from other localities, and the females show no tendency to a greater frontal development of hair than the males.

But with the females sent by Mr. Watson are two skins, marked as males, and apparently correctly so. But these specimens have their heads short-haired, exactly as in ordinary *C. hypoleucus*, from which they only differ externally by their white parts being a clearer and less yellowish white than in that animal. But their canine teeth are quite small, as though they were females, in fact barely larger than in the females sent with them.

The interesting problem therefore remains to be settled as to whether these specimens, which come from exactly the same place as the females, are really wrongly sexed females of *C. hypoleucus*, or whether the male *C. imitator* differs in its frontal covering from its female and in its small canines from all other *Cebi*.

### *Diclidurus virgo*, sp. n.

As in *D. albus*, but with differently shaped incisors and premolars.

General characters as described in *D. albus* by Dobson, whose account is based in part on a Central-American example\*. Colour above either pure white to the roots of the hairs, or grey-mixed, the hairs being then slaty at base. Below the hairs on the belly are always broadly slaty for their basal halves; those on the chin and sides of body pure white.

\* Specimen *a* of the 'Catalogue of Chiroptera,' p. 392, is not from "South America," but is the example from Pueblo Nuevo, N.W. Panama, mentioned in the "Voyage of the 'Sulphur.'"

Upper incisors exceedingly weak, their main cone without any posterior secondary cusp, though their cingulum develops a minute cusplet anteriorly, and a second posteriorly, the latter being, however, at least as far from the tip as is the secondary cusp of the canine from its tip. (In the specimen which I refer to *D. albus* each incisor is bifid, with a distinct posterior secondary cusp rather more than halfway up the main cusp, while the cingulum does not develop any trace of additional cusplets.) Small premolar not nearly filling up the space between the canine and the large premolar, but well separated from the latter.

Dimensions of the type, in skin (soft parts measured by collector in flesh) :—

Forearm 66 millim.

Head and body 80; tail 22; hind foot 10; ear 13.

Third finger, metacarpal 64, first phalanx 10. Fifth finger, metacarpal 35, first phalanx 17. Calcar 22.

Greatest length of skull 18. Front of canine to back of  $m^3$  8.1.

*Hab.* Central America. Type from Escazu, Costa Rica. Other specimens from Guatemala, San José, Costa Rica, Pueblo Nuevo, N.W. Panama, and Boquete, Chiriqui.

*Type.* Adult female. B.M. no. 98.10.9.3. Collected 2nd November, 1897, by C. F. Underwood.

The six Central-American specimens of *Diclidurus* in the British Museum all agree in the above characters, and are clearly different from an individual believed to be from Surinam, which latter may be taken provisionally to represent the Brazilian *D. albus*.

It does not seem to have been hitherto noticed that the remarkable horny tail-capsules characteristic of *Diclidurus* are present only in the male, the female having merely a slightly modified indication of their position.

### *Diphylla centralis*, sp. n.

Externally quite similar to *D. ecaudata*, except that the legs are rather less heavily haired, and there is not so much white on the digits and tips of the wings. Colour of back and belly, where the hairs are dark to their bases, near "seal-brown"; anteriorly on the shoulders and neck the colour is markedly lighter, owing to the broad whitish bases to the hairs. *D. ecaudata* is rather darker throughout, with less white on the bases of the shoulder hairs.

Skull rather rounder and less sharply arched above than in



*D. ecaudata*; interorbital region narrower. Zygomata more widely and evenly spread. Bullæ larger and higher.

Upper teeth apparently quite as in *D. ecaudata*, but below the last three cheek-teeth ( $p_3$ ,  $p_4$ , and  $m_1$ ) are subequal in size, while in three South-Brazilian examples of *D. ecaudata* the penultimate ( $p_4$ ) is fully twice the size of  $m_1$ , and half as large again as  $p_3$ . Lower canine rather shorter, and with a more strongly marked posterior basal ledge.

Dimensions of the type:—

Forearm 54 millim.

Head and body 87; ear 15; third finger, metacarpal 54; first phalanx 11, second phalanx 28.

Skull: greatest length from tip of incisors 22·8; basal length from same point 17·2; zygomatic breadth 12·6; breadth of brain-case 11·3; palate length 7; post-palatal length 10·2.

*Hab.* Boquete, 4500 feet.

*Type.* Adult male. B. M. no. 3. 3. 3. 3. Original number 62. Collected 4th March, 1902. One specimen.

In spite of their general resemblance to each other the difference in the proportions of the lower teeth seems to necessitate the distinction of the Central-American *Diphylla* from that of Brazil.

*Bassariscus Sumichrasti notinus*, subsp. n.

Size rather smaller than in *B. S. variabilis*, Pet.\*. General colour approximating to "smoke-grey," though slightly more olivaceous, lighter and less heavily black-lined than in *variabilis*. Across the shoulders especially the colour is a much clearer grey than in that form, and there is but little trace of the mesial dark nuchal band. Muzzle and orbital rings brown; the forehead lighter, but divided between the eyes by a dark line. Cheeks and patch behind eyes white. Outside of ears more thinly haired than in *variabilis*, and only brown for their basal halves, the terminal halves lightening to white on the edges. Postauricular dark patch present, but less developed than in *variabilis*. Under surface dull buffy white, more or less mixed with grey. Upper surface of hands and feet grizzled fawn-grey, darkening nearly to black on the digits, but with less black than

\* In the absence of good specimens of the geographically more distant *B. Sumichrasti* the comparisons are made with the Guatemalan *B. variabilis*, of which the British Museum possesses several excellent specimens from the Volcan de Fuego, Guatemala, agreeing absolutely with Peters's description and figures of the skull.

in *variabilis*. Tail with ten black rings, the terminal two continued into the end tuft, the white rings along its middle portion as broad as the black ones, better developed than in *variabilis*.

Skull as compared with that of *variabilis* smaller, flatter, with a broader interorbital region and more gently expanded zygomata. Notches at back of palate about a millimetre behind the level of the back of  $m^2$ , while in *variabilis* they come opposite the middle of that tooth; a long (3.5 mm.) median spine present, much longer than in the allied form. Bullæ low.

Teeth small throughout. Incisors short and narrow. Carnassial very small, and practically without any trace of the small supplementary cusps in the middle of the antero-internal and postero-internal borders, the internal lobe being therefore unusually small and simple.

Dimensions of the type (measured in skin):—

Head and body 457 millim.; tail 396; hind foot, s. u. 84, c. u. 89; ear 45.

Skull: greatest length 87.3; basal length 77; zygomatic breadth 56; nasals 166 (in middle line)  $\times$  6.5; interorbital breadth 18; breadth of brain-case 35; palate length 38. Greatest diameter of  $p^4$  7.5, of  $m^1$  8.5, of  $m^2$  6, of  $m_1$  7.6, of  $m_2$  6.7.

*Hab.* Boquete, 6000 feet.

*Type.* Adult male. B.M. no. 3. 3. 3. 22. Original number 149. Collected 5th August, 1902. One specimen.

The present is the most southern record of the group. *B. S. notinus* may be distinguished from *B. S. variabilis* by its paler colour, smaller skull and teeth, and longer palate. An example from the Volcan de Cartago, Costa Rica, agrees with it in some respects and seems to indicate intergradation with *variabilis*, on which account I consider it a subspecies only.

I am not prepared to accept Dr. Jentink's identification of Wagner's *Paradoxurus annulatus* with *Bassariscus Sumichrasti*, as the type was so young as to make any satisfactory determination impossible. When visiting the Munich Museum in 1887, I looked for the specimen, but nothing was there under Wagner's name, and in the catalogue, in his handwriting, I found the following note to *P. annulatus*: "jung, = *P. musanga*, juv." Moreover, there is a young Musang in the collection which agrees in many respects with the description of *annulatus*, and might be the type.

On the other hand, Jentink's name *Wagneria*, being based on a specimen really assignable to *Bassariscus Sumichrasti*,

might be accepted by those who think this group should be generically separated from true *Bassariscus*.

*Coendou lænatus*, sp. n.

Allied to *C. mexicanus*, but smaller, more heavily clothed, and with less inflated skull.

General external appearance as in *C. mexicanus* and *C. m. yucatanicæ*; the woolly coat very thick, soft, and long, and more entirely hiding the spines than usual, the spines only showing through the fur on the head, and very inconspicuously along the sides, not on the tail or limbs. Colour of fur blackish brown throughout.

Spines of back attaining to about 38–40 millim. in length, their basal three fifths pale yellowish white, less yellow than in the allied forms, their ends brownish black with a slightly paler horny tip. Spines of head shorter, only attaining about 30 millim. in length, still whiter, their basal fourth only tinged with yellow, and with their dark end only about one sixth of their length. Under surface blackish, the spines as usual bristly and black-ended. Hands, feet, and tail wholly black.

Skull entirely different from that of *C. mexicanus*. Much smaller, flatter, and not inflated in the frontal region. Muzzle not abnormally thrown forward, the anterior part of the premaxilla projecting but little in front of the nasals, so that the plane of the nasal opening is almost vertical. Nasals broad in front, strongly and evenly narrowing backwards—in *mexicanus* they are parallel-sided, or even narrow forwards. Supraorbital edges square posteriorly, with well-defined ridges. Palatal foramina ending just at the premaxillo-maxillary suture. Hinder edge of palate level with the back of  $m^2$ . Bullæ rather smaller than in *C. mexicanus*.

Dimensions of the type (measured in the flesh):—

Head and body 452 millim.; tail 256; hind foot, s. u. 65, c. u. 75.

Skull: greatest length 80; basilar length 67; zygomatic breadth 47; nasals—length 24, breadth anteriorly 16, breadth at fronto-premaxillary suture 12·8; interorbital breadth 25·5; height of forehead at back of nasals from palate between premolars 27·7; diastema 21; length of palate 35·7; length of upper tooth-series 19.

*Hab.* Boquete, 5000 feet.

*Type.* Adult (not sexed). B.M. no. 3. 3. 3. 94. Original number 124. Collected 15th November, 1902.

"Caught in forest. Native name: *Gato de spinas*."—H. J. W.

It is of much interest to find this representative of the more northern *C. mexicanus* group existing side by side with the southern type to which *C. Rothschildi* belongs.

As a species *C. lænatus* is readily recognizable by the peculiar characters of its skull, and especially of its nasal region.

## LII.—Two South-American Forms of *Rhogeessa*.

By OLDFIELD THOMAS.

IN his monograph of North-American Vespertilionidæ\* Mr. Gerrit S. Miller has given an account of the species of *Rhogeessa* occurring in North and Central America and in Margarita Island, but he had not seen any from the mainland of South America.

In the British Museum there are examples of two forms from the latter continent closely allied to each other and to the Central-American *R. tumida*, but sufficiently distinct to require names.

The first may be called

### *Rhogeessa io*, sp. n.

Size rather less than in *R. tumida* and skull more delicately built. General colour rather more yellowish than in *R. tumida*, the optical mixture across the shoulders of the usual light bases† and dark tips of the hairs resulting in a hue approaching Ridgway's "raw umber," while in *R. tumida* it is deader and nearer "broccoli-brown." The dark brown ends to the hairs are the same in both. Under surface again slightly more yellowish and less brown than in *R. tumida*. These comparisons are made on specimens which have never been in spirit, and are therefore trustworthy for the purpose. Ears rather smaller, and narrower in proportion than in *R. tumida*, the length from the inner basal lobe to the tip 10 millim. as against 11 millim. in the allied form. Wing-membranes uniformly brown, without posterior white edging.

Skull markedly smaller and more delicate throughout,

\* N. Am. Faun. no. 13, p. 122 (1897).

† A toptype of *R. parvula*, H. All., from the Tres Marias Islands, has the bases of the hairs light as usual, although Mr. Miller speaks of the species as being distinguished by the hairs being "darker at base." But Dr. Harrison Allen's words do not necessarily bear the interpretation Mr. Miller has put upon them, as he speaks of the colour as a "light greyish brown at basal third."



flatter above, with lower and narrower brain-case, less widely expanded zygomata, and less convex forehead. Occipital "helmet" well developed, the posterior outline in upper view markedly angular mesially.

Teeth as in *R. tumida*, but slightly smaller throughout.

Forearm of the type (♂) 28 millim. Of three paratypes, (♂) 27·6, 28·3, (♀) 29.

Other dimensions of an adult male in spirit :—

Head and body 38 millim.; tail 28; head 15; ear-length 12·5; third finger, metacarpus 25·5, first phalanx 10, second phalanx 9·3; lower leg and foot (c. u.) 15·5; calcar 10.

Skull: greatest length 12·1; length in middle line above 10·3; zygomatic breadth 8·1; breadth of brain-case 6·0; front of lower canine to back of  $m_3$  5·0.

*Hab.* Valencia, Venezuela.

*Type.* Skin. Male. B.M. no. 94. 9. 25. 1. Collected Nov.-Dec., 1893, by A. Mocquers. Three paratypes in spirit and an additional skin from Bogota (*G. D. Child*).

*Rhogeessa velilla*, sp. n.

Closely similar to *R. io* in all respects, agreeing with it in size, colour\*, and proportions, but the skull is quite without the marked "helmet" found in all the other forms, the posterior line of the skull running directly across without mesial angular projection behind. This character is an important one and has even been made the basis of the generic distinction of "*Eptesicus*" from *Vespertilio*. Like, therefore, as *R. velilla* is to *R. io* in other respects, I am compelled to consider it distinct on this account. The specimen is at least as old as, if not older than, the Venezuelan examples with which I have compared it.

Dimensions of the type :—

Forearm 28 millim.

Head and body 40 millim.†; tail 35†; third finger, metacarpal 25, first phalanx 8·8; lower leg and foot (c. u.) 16; calcar 10.

Skull: greatest length 11·8; length in middle line above 10·0; interorbital breadth 3·1; breadth of brain-case 5·7; front of lower canine to back of  $m_3$  4·9.

*Hab.* Puná, Puná Island, Gulf of Guayaquil, Ecuador.

*Type.* Old male. B.M. no. 99. 8. 1. 5. Original number 43. Collected 11th November, 1898, by the late P. O. Simons.

\* Light bases to hairs rather more whitish.

† Measured by collector in the flesh. The other dimensions from the dried skin.

LIII.—*Parasite on the Wallaby.*

By W. WESCHÉ, F.R.M.S.

MR. FRANK LITTLER, of Launceston, Tasmania, sent me, through the medium of 'Science Gossip,' a fly which he tells me is parasitic on the wallaby; these animals, when sick, are said to swarm with them.

The insect is a Dipteron, and belongs to the family Hippoboscidae, but is unknown to me; and a search in the cabinets at the British Museum (Natural History) failed to determine

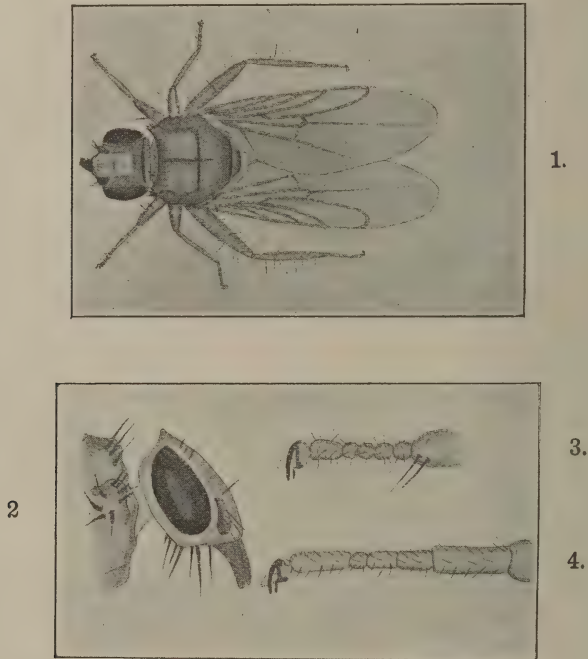


Fig. 1.—Parasite on wallaby, dorsal view.

Fig. 2.—Head, lateral view.

Fig. 3.—Tarsi and claws of middle leg.

Fig. 4.—Tarsi and claws of hind leg.

it. It can, however, now be seen there, as I deposited specimens, including the "type" specimen, with Mr. E. E. Austen. It is remarkable for two curious spined tubercles—one might almost call them epaulets—on the shoulders, a

median suture on the thorax, and for a peculiar venation of the wings.

The family Hippoboscidæ is represented in England by six genera, and it is impossible to place this insect in any one of them. I therefore propose, till a fitting genus has been found for it, provisionally to call it *Hippobosca tasmanica*. I here give a figure of the insect seen dorsally and showing the venation of the wings.

The species may be briefly characterized as follows :—

*Hippobosca tasmanica*, sp. n., ♂ or ♀.

*Head* broad and flat. Viewed laterally it has a rather pointed crown. No hair on eyes. Antennæ sunk in cavities; a few short hairs on them, but no arista. Proboscis of usual *Hippobosca* type, with pronounced palpi. A long bristle on each side of the mouth, pointing downwards like a tusk.

*Thorax* leathery, light brown; has a spined tubercle on each shoulder. Suture very marked—a median suture on the anterior portion of the thorax; starting from the posterior side of the transverse suture, it bisects it at right angles. No tegulæ (?). Halteres appear to have lost their knobs, but owing to the condition of specimens nothing certain can be said on these two points.

*Abdomen* darker in colour than thorax, short and stout.

*Wings* very long, with characteristic venation.

*Legs*. Hind pair long and fringed with fine long pubescence; apical setæ on tibiæ. Middle legs shorter, tarsi reduced in size. Fore legs with stout femora.

No characters to distinguish sex made out.

Length of body 5 millim., or to extremity of wing 8 millim.

*Hab.* Tasmania; parasitic on the wallaby (*Macropus ruficollis*).

LIV.—*The Musk-Rat of the Antilles* (*Mus pilorides*) as Type of a very distinct Genus (*Megalomys*, Trt.) under the new Generic Name *Moschomys*. By Dr. E. L. TROUESSART, C. M. Zool. Soc. of Lond. (in Paris).

I.—WHEN in 1881\* I created the genus *Megalomys* for the “Rat musqué (Pilori)” of Rochefort (*Mus pilorides*, Desmarest, 1826) I regarded this type simply as a subgenus of

\* ‘Le Naturaliste,’ no. 45, p. 5 (1881); Ann. Sc. Nat., Zool. xix. 1885, article 5, p. 13, pl. i.

*Hesperomys*, because the subdivisions of this great group of American rats were at that time considered by naturalists merely as subgenera.

Now the subgenera *Rhipidomys*, *Oryzomys*, *Calomys*, *Onychomys*, &c. are looked upon as true genera, and several of them are already subdivided. *Megalomys* having the same importance, it seems right to raise it also to the rank of a genus.

Yet in 1897, when writing the 'Catalogus Mammalium' (Pars III. Rodentia), I allowed myself to be influenced by a prior suggestion of Mr. O. Thomas\*, and in contradiction to the opinion for which I contended, with some reason, in my work of 1881 and 1885, based on the original specimens of Plée (from Martinique) in the Museum of Paris, I referred, too hastily, *Megalomys* to the genus *Holochilus*, Brandt, as a simple subgenus. Indeed, *Megalomys pilorides* and *Holochilus vulpinus* are alike only as regards their large size.

More recently, Dr. C. I. Forsyth Major, in a short preliminary note†, and without giving the reasons for this identification, connects *Megalomys* with the genus *Oryzomys*, another subdivision of the old genus *Hesperomys*.

On this occasion I fear my learned friend, Dr. Forsyth Major—who is, first of all, a paleontologist, that is to say, an anatomist,—let himself be influenced by the cranial features of *Mus pilorides*, which are, in my opinion, common to all the large species of Muridæ, and disregarded the important zoological characters which clearly distinguish *Megalomys* from *Oryzomys*.

In reality *Megalomys pilorides* and *Oryzomys palustris* (the type of the last genus) are much more distinct than, for example, *Evotomys glareolus* and *Arvicola amphibius*. One is exclusively terrestrial, the other aquatic, and the characters of both are perfectly in accordance with their habits. This will be seen from the following table, in which I quote the words employed by Baird‡ in his description of *Oryzomys palustris*, or, more correctly, those used by Elliott Coues§, to distinguish this type species:—

\* "On a Collection of Muridæ from Central Peru" (Proc. Zool. Soc. Lond. 1884, pp. 447 et seq.).

† "The Musk-Rat of Santa Lucia" (Ann. & Mag. Nat. Hist. ser. 7, vii. 1901, pp. 204–206).

‡ 'Mammals of North America,' 1857, pp. 458 & 482–483. It should be noticed that the characters of the subgenus *Oryzomys* (p. 458) are incomplete, as only those are mentioned in which it differs from *Hesperomys*, properly so-called, and from *Onychomys*.

§ 'Monograph of the Rodentia of North America,' Muridæ, 1877, pp. 111–113.



*Megalomys pilorides.*

Terrestrial.

a. Ears entirely naked both sides, largely overtopping the fur, without tuft of hairs on the concavity.

b. Hind feet very long, but compressed, with parallel short and stout toes.

c. No trace of web at the base of the toes.

*Oryzomys palustris.*

Amphibious.

a. Ears hirsute both sides, small, little overtopping the fur, with a fluffy tuft of hairs on the concavity.

b. Hind feet very long and large (as in *Fiber*), with obliquely set long and slender toes.

c. A slight but evident web at the base of all the toes.

These three characters are quite sufficient to necessitate the separation of the two genera. That being granted, I shall willingly acknowledge that very likely *Megalomys* represents the terrestrial type of *Oryzomys*. As regards the superciliary crests of the skull, the anteorbital foramen, and even the structure of the teeth, I shall prove elsewhere that they have nothing peculiar to permit of uniting the two genera, but are characters of all the largest Muridæ or of many of the American Cricetinae.

The genus *Megalomys* includes at the present time three species:—(1) *Mus pilorides*, the type of the genus; (2) *Oryzomys luciae*, Major (*loc. cit.*); and (3) the fossil species (of Barbuda) referred to, but not described, by Dr. Forsyth Major in the above-mentioned note.

II.—There remains still to elucidate a double question of nomenclature—(1) The genus of which *Mus pilorides* is the type might retain the name *Megalomys*; (2) the species must be called "*pilorides*, Desmarest, 1826," as I have admitted, or be known by the name of "*piloris*, Zimmermann, 1777," as Dr. Forsyth Major wishes, or else, again, as Mr. J. A. Allen\* suggests.

First, it must be remembered that Laurillard, in 1848, created under the name "*Megamys*" a genus of fossil Rodentia which includes the largest mammals of this order at present known. Now, this name of *Megamys* is wrong as an abbreviation of "*Megalomys*," the only name correctly formed.

In agreement with the rules of nomenclature prescribed by the International Zoological Congresses, "*Megamys*" ought to be rectified into "*Megalomys*," and, consequently, *Megalomys* (Trouessart, 1881), given to *Mus pilorides*, is not available, as preoccupied, and must be altered.

Accordingly I propose to substitute for *Megalomys* (Trt.,

\* Bull. Amer. Mus. Nat. Hist. xvi. 1902, pp. 13, 20.

1881, nec Laurillard, 1848) the new name of *MOSCHOMYS* (Musk-Rat).

As for the specific name of the type of this genus, the question is more complicated. The name "*pilorides*" (Pallas, 1778) ought to be dropped, Pallas\* having under this name included two very distinct species. One is the *Mus albus ceylonicus*, Brisson (Quadr. Epitome, p. 122, sp. 8), given as being from Ceylon (!), the description of which indicates that it is really the type of *Mus pilorides*, and in nowise agrees with the second species, the musk-rat of the Antilles, the fur of which is black on the back.

The name "*piloris*," proposed by Dr. Forsyth Major is also untenable, Zimmermann having only used it in imitation of Buffon as a vernacular name. Indeed, in the 'Geographische Geschichte' (ii. p. 360) he refers the "Rat musqué" of Rochefort to *Mus pilorides*, Pallas, whose synonymy he copies entirely. The name "*Castor pilorides*" was bestowed by Pallas, who latinized, in 1778, the vulgar name given by Zimmermann in 1777.

The name "*Cavia moschata*," latinized also by Pallas from the "Musk-Cavy" of Pennant, is synonymous with "*pilorides*, Pallas," and for the same reasons must be rejected.

Finally, there remains the name "*Desmaresti*," created in 1829 by Fischer† for the *Mus pilorides*, Desmarest (nec Pallas), which is incontestably the "Rat musqué de la Martinique" of Rochefort‡; and this name is applicable to the species under consideration, as already proposed by Mr. J. A. Allen (*loc. cit.* 1902).

The genus *Moschomys* will thus include the following three species:—

1. *Moschomys Desmaresti*, Fischer, 1829 (La Martinique).
2. — *luciae*, Major, 1902 (Santa Lucia).
3. — *nova species* (fossil), Major (Barbuda).

\* 'Novæ Species ordine Glirium,' 1778, p. 91. Likewise the identification of *Mus pilorides*, Pallas (= *Mus albus ceylonicus*, Brisson), with the *Capromys* from Cuba is very doubtful, and practically not allowable. Consequently the name "*Capromys Fournieri*, Desmarest, 1882," is preferably to be applied to this species, and "*pilorides*" must be entirely cancelled as a systematic name and rejected from the synonymy.

† 'Synopsis Mammalium,' 1829, p. 316 (= *Mus pilorides*, Desmar., Dict. Sc. Nat. t. xliv. (1826) p. 483)—not 'Nouv. Dict.,' as Fischer says by mistake.

‡ Fischer says "In insula Martinica, *D. Plée*."

LV.—*Observations on the Flight of Flying-fish*  
(*Exocoetus, sp. incertæ*). By G. E. H. BARRETT-HAMILTON.

IN reply to a request for advice on the subject, Mr. Boulenger has been good enough to inform me that, despite what has been already written, there is still room for a small contribution to the literature of the flight of flying-fish. Hence arose the following notes, the result of much study of these beautiful creatures during several ocean voyages.

The precise use of the so-called "wings" of flying-fish and the nature of their flight have given rise to much discussion amongst naturalists, some of whom, as Professor C. O. Whitman\*, hotly maintain that the wings are flapped, while others, amongst whom are Professor K. Möbius\*, deny that genuine muscular movements ever occur. Although I have never enjoyed the opportunity of observing the flight of the flying-gurnards (*Dactylopterus*), I have frequently and carefully watched and studied that of the flying-herrings, with the result that I can thoroughly corroborate the late Professor Moseley's observation† that in this genus at all events the wings are never moved as organs of true flight. They may vibrate or quiver under the action of air-currents or the shifting a little of their inclination by the fish; the whole motive power is supplied by the powerful tail. The wings are a parachute to augment the action of this propeller. Their motions are in no way comparable to those of the wings of a bird.

Whatever objections may be raised against observations taken from the artificial height of the deck of an ocean-going steamer, this method affords an unrivalled opportunity of overlooking the expanded pectorals as the fish emerge from the water almost directly beneath the observer. Again, since the cause of the numerous flights which take place in the immediate proximity of the ship is undoubtedly fear at her approach, the fish which thus come under observation invariably use their utmost powers of flight, and, could any single one of them voluntarily flap its wings, it would certainly do so to the extent of its entire ability. A careful observer

\* See K. Möbius, "Die Bewegungen der fliegenden Fische durch die Luft," Zeitschrift für wissenschaftliche Zoologie, Suppl. vol. xxx. p. 343 (1878); and C. O. Whitman, 'American Naturalist,' vol. xiv. p. 641 (1880).

† H. N. Moseley, "Notes by a Naturalist on the Voyage of H.M.S. 'Challenger,'" new edition, 1892, p. 495; an opinion formed also by Mr. W. L. Distant, 'A Naturalist in the Transvaal,' 1892, pp. 2-4.

should therefore with practice be able to assure himself of the correctness of his observations.

Some naturalists further declare that these flying fish can fly only against the wind, and no doubt the assistance thus derived enabled those which I have seen to leave the water more numerous to windward than to leeward of the ship. My experience shows, however, that while the larger fish can fly in any direction, the smaller only possess the power of flying down-wind. Rising in the air with a leap against the wind, they turned over before its force, and were carried before it for a short distance like a piece of paper until they touched the water, when they restarted their flight by another active leap. There could be no doubt that the highly muscular tail supplied the motive power, and a high wind is probably needed for the most successful flights. On one occasion I observed a fish accomplishing a far longer flight than usual, rising straight up against the wind in its course, and once again quite a large individual came aboard and was shown to me. It reached about a foot in length, and though partially dried up and moribund exhibited well the muscular power of the tail when placed in a pan of salt water.

I find it a little difficult to reconcile a statement like the following from the pen of Mr. Alfred Russel Wallace\* with my own very careful observations. Writing of a species which he found numerous on December 30th, 1856, near the Island of Teor, in the Banda Sea, he declares that it is both smaller and "more active and elegant in its motions" than that of the Atlantic. "As they skim along the surface they turn on their sides, so as to fully display their beautiful fins, taking a flight of about a hundred yards, rising and falling in a most graceful manner. At a little distance they exactly resemble swallows, and no one who sees them can doubt that they really do fly, not merely descend in an oblique direction from the height they gain by their first spring."

It seems likely that this description applies to some species not of *Exocætus*, but of *Dactylopterus*. It is, however, not altogether inapplicable to *Exocætus*, which turns on its side frequently when struck by currents of wind, and, when skimming along the surface of the water, renews its flight whenever contact takes place by an almost imperceptible muscular effort. I have often observed this, as well as the resemblance to the flight of a swallow. This results from the perception of the up-and-down movements of several fish, which, moving in company, the eye is unable to separate.

\* 'The Malay Archipelago,' &c., ed. of 1898, p. 316.



The flight of two or three individuals, one falling, another rising, is thus blended into one apparently continuously undulating movement, while the sudden leap which precedes each rise in the air escapes notice. The fish is, in fact, so silvery and difficult to follow with the eyes, especially when of small size, that I would on no account trust the casual observations of an ordinary observer. I suspect that even Mr. Wallace, who had no especial scientific purpose in view when he saw the flying-fish, may have been deceived by their rapid motions. This is the more likely since Professor Kukenthal, who took particular trouble to investigate the flying-fish of almost the same seas, and who used a small boat in order that his observations should be the more accurate, is quite convinced that he never saw an instance of true flight amongst them.

More positive and inexplicable are the statements of Professor Whitman, who declares that he was able to see "distinctly the individual flaps of the large pectorals, while the ventrals were held in quiet expansion. The flapping movement, which is quite regular and rapid—so rapid that it is not easily recognized at any great distance until experience has sharpened the eye,—may be continued for the whole or part of the flight, but it is generally discontinued after the first few rods, and the course completed by a pure skimming or sailing movement. In some cases I have seen the flapping of the fins renewed once or twice after short intervals of the sailing movement" \*.

Similarly, Captain A. R. S. Anderson † describes "a very rapid fluttering of their wings, lasting for two or three seconds," and has "very occasionally . . . observed these fish fluttering their wings without touching the water with their caudal and ventral fins."

Such diametrically opposing statements repeated by well-qualified observers make it seem extremely likely that the fish which came under the notice of Professor Whitman, Captain Anderson, and myself were (as is more than possible) totally distinct. But amongst so much apparent contradiction there is really almost complete accord on the one important point—namely, that the so-called "fluttering" or "flapping," if it does occur, is almost invariably discontinued after the

\* *Op. cit.* p. 646.

† 'Administration Report of the Marine Survey of India for the Official Year 1898-1899.' Bombay: Government Central Press, 1900. Noticed by R. L. in 'Nature,' February 28, 1901, p. 427. I have *not* been able to see the original. A like observation has been made by the editor of the 'Royal Natural History.'

flight has really commenced. It is in nearly every case merely an accompaniment of the initial spring into the air.

In this fact I venture to think that agreement may be found; but I feel no misgivings as to the accuracy of my own observations, which were not confined to a single voyage, but extended to many in the most diverse oceans, such as the Atlantic, the Pacific, the Indian, as well as the China Sea. And yet, although constantly on the look out, I have never once seen anything at all approaching Professor Whitman's "flapping movement." Further, I find myself in the excellent company of Moseley, of Professor Kukenthal\* (whose careful study leads him to lend his complete support to those who declare that the wings of the flying-herrings are of mere parachute-like function), and of the American ichthyologists†, Messrs. D. S. Jordan, B. W. Evermann, and C. H. Gilbert, who have studied flying-herrings under the most favourable conditions, and who describe the "rapid vibration" of the pectorals as "apparent only, due to the resistance of the air to the motions of the animal." Movements of the fins there certainly are, as I too admit, but they are merely connected with the initial muscular spring, with balance, or, perhaps, even with alterations of direction. The originating and only cause of the flight, as it came under my eyes, is the muscular leap from the ocean.

When we come to deal with other genera of flying-fish, however, there are undoubtedly very different grades of perfection of flight, since Moseley distinctly observed rapid "buzzing" of the wings in the case of a species of "flying-gurnard." The flight of this species appeared to him "to be closely similar to that of many forms of grasshoppers, which cannot fly for any great distance, but raise themselves from the ground with a spring, and, eking out their momentum as much as they can by buzzing their wings, fall to the ground after a short flight." If this represent the acme of perfection of flight reached by a fish, we have at the other end of the scale species such as that which the sailors aptly name the "Skipjack" (probably a member of the genus *Hemirhamphus*). This is a small silvery fish, which I have seen in the Atlantic a few days south of the Canaries on the run to Cape Town. It occurred in large numbers on particular areas of the water's surface, from which it constantly leapt to a height of a few inches. It was impossible to tell the cause of the disturbance

\* See 'Abhandlungen herausgegeben von der Senckenbergischen naturforschenden Gesellschaft,' Band xxii. 1896, pp. 9-11.

† 'The Fishes of North and Middle America,' Bulletin U.S. National Museum, no. 47, part i. 1896, pp. 730-731, footnote.

or whether the fish were pursuing or being pursued by some other creatures. Food must have been abundant, since a good many birds of some unknown species were present in the near distance, and there were great herds of small dolphins which made the water boil again around the ship. Annectant between the skipjacks (*Hemirhamphidæ*) and the flying-herrings (*Exocætidæ*) is Mr. H. W. Fowler's genus *Hemioxocætus* \*. Less skilful again, but still, perhaps, foreshadowing the flying leaps of *Exocætus*, are the shoals of herrings and mackerel which on calm nights stir British waters into phosphorescence.

Instances of the jumping of fish of numerous kinds above the surface of the element in which they live are, as is well known, frequent.

One of the most interesting is that afforded by a close ally of the flying-fish, the little gar- or needle-fish (*Belone*), which came under the observation of Moseley †. These fish, he writes, when hotly pursued by the "skipjacks," "dashed out of the water, and by violent lashing of their tails managed to keep themselves above the water in a nearly upright position for a distance of several yards as they moved swiftly from the danger." The leap of the gar-fish as well as those of the whip-ray and king-fish have been beautifully figured by Mr. J. Turner-Turner ‡.

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LVI.—*New Species of Indian Aculeate Hymenoptera.*

By Major C. G. NURSE, Indian Army.

THE insects dealt with in the present paper form part of a collection made by me during the last eighteen months. The greater part of the collection was made at Deesa, where I was stationed most of the time; but a number of Hymenoptera obtained during a two months' leave to Kashmir are also included, as well as a collection made by a native, whom I employed for two months at Mount Abu in 1901.

Deesa is situated at the extreme north of the province of Gujarat, being about 40 miles distant from Mount Abu. The climate is very hot and dry, and the rainfall, which in ordinary years averages from 25 to 30 inches, has been very

\* 'Proceedings of the Academy of Natural Sciences of Philadelphia,' April 1901, pp. 293-294.

† *Op. cit.* p. 414.

‡ 'The Giant Fish of Florida,' 1902, plates opposite titlepage and pages 66 & 142.

short during the last few years, and the district has consequently suffered to a considerable extent from famine. The best months for collecting Hymenoptera are March and April, and again in September and October; but there is no month in the year when a certain number of species cannot be obtained, and some specimens occurred during the cold weather which I never saw at any other time.

I had previously collected at Deesa and elsewhere for about three years, and new species from my collections have already been described by Lt.-Col. Bingham in the *Journal of the Bombay Natural History Society*, by Mr. Cameron in the same *Journal* and in various other papers, some of which are still in course of publication, and by myself in the *Journals of the Bombay Natural History Society* and of the *Asiatic Society*.

In the present paper I have included descriptions or remarks on a few species already known, in cases where only one sex has hitherto been described, or where the descriptions published appear to require amplification. My collection contains, in addition to the species now described, and those enumerated in the papers mentioned above, a number of species which I have set aside as possibly new, but which require comparing with types, and also several which probably belong to new genera. These I have reserved for further study. The number of new species already obtained from a single locality so apparently unpromising as Deesa renders it highly probable that when the bees and wasps of India are more fully known, the number of species will considerably exceed the estimate of 2000 made by Bingham and others, although doubtless many so-called species will disappear as varieties as further material becomes available.

*Mutilla Philippa*, sp. n.

♂. Head and abdomen finely and shallowly, but not very closely, thorax somewhat more deeply punctured; antennæ rather shorter than the head and thorax united, third and fourth joints of the flagellum subequal; head somewhat narrower than thorax, eyes slightly emarginate, the vertex shining; mesonotum with two parallel longitudinal furrows from base to apex; median segment coarsely reticulate, widened and rounded posteriorly, with a wedge-shaped groove, widest above, bounded by carinæ; abdomen with the basal segment very small, with a ventral keel, which has a slight curve, and is dentate at apex. Head, thorax, and first abdominal segment black, remainder of abdomen light, shining, red;



scape of antennæ, head, thorax, and legs with somewhat long grey pubescence, thickest on the pronotum and scutellum; abdomen with golden pubescence. Wings fuscous, with three cubital cells; radial cell short, obtuse at apex, the apex of the third cubital cell not reaching beyond that of the radial cell; in the fore wing the third transverse cubital nervure and second recurrent nervure are narrower than the other nervures; nervures and tegulæ black.

Long. 12-14 millim.

*Hab.* Deesa; fairly common.

This species would come into Bingham's key on p. 9 after *M. Emeryi*, under a new section  $\epsilon^2$ . "Abdomen, except basal segment, red." In general appearance it looks like a small and faded male of *M. sex-maculata*, which sometimes has the apical abdominal segment red. But the scutellum is normal and very different from that of *M. sex-maculata* (see Cameron's description in Ann. & Mag. Nat. Hist. for July 1899, p. 62).

*Mutilla suspecta*, sp. n.

♂. Head, thorax and abdomen strongly punctured, the punctures on the median segment being larger and coarser than elsewhere; head narrower than pronotum, rounded posteriorly; pronotum transverse anteriorly, mesonotum and scutellum much raised, median segment rounded posteriorly; first abdominal segment rather short, at apex about one third the width of second segment, which is wider than thorax, apical abdominal segment rounded. Black, the antennæ rufous at apex; scape of antennæ, head, thorax and abdomen covered with silvery pubescence, intermixed with a few black hairs, the pubescence on the head and pronotum having a matted appearance; narrow apical bands on first and second abdominal segments, the whole of the third segment, and two median spots on the second segment, in addition to the apical band, one spot being basal and minute, the other apical and larger, the latter joining on to the apical band, all of silvery pubescence; apical abdominal segment with the black hairs predominating; legs with white pubescence, calcaria black. Both wings hyaline at base, infuscated at apex, the median third of fore wing with a flavous tinge, nervures and tegulæ black; radial cell very short, rounded at apex. The number of cubital cells varies from two to three; when the latter number are present the third is very much narrowed at the top, the second and third transverse cubital nervures almost joining at the radial nervure.

Long. 9-10 millim.

*Hab.* Deesa; several specimens.

This species is allied to *M. climia*, described by Mr. Cameron in the Journal of the Bombay Natural History Society, vol. xiv. p. 267; but M. André, to whom I sent a specimen, considers it distinct. I have always taken it in close proximity with *M. durga* (Bingh.), and strongly suspect it to be the male of that species.

*Mutilla adscripta*, sp. n.

♀. Head closely and rather coarsely, thorax rugosely punctured; abdomen with fine and close punctures hidden by pubescence; head large, wider than thorax, concavo-truncate posteriorly; thorax wider at apex than at base, the edges, viewed from above, rough and almost dentate; abdomen about as long as head and thorax united. Black, the thorax above dark red, the second abdominal segment is under the pubescence bright red, but this is not apparent until the pubescence is rubbed off; abdomen below red; pubescence on head and thorax greyish white, sparse above; abdomen with black velvety pile, second segment with two very large sublateral oval marks of golden pubescence, these spots sometimes, owing to attrition, appearing to coalesce, third segment with two sublateral round spots of white pubescence, fourth segment ciliated with white; sometimes the fourth and fifth segments have white spots similar to those on the third segment, but less clearly defined; legs spinose, with white pubescence, the spines black, calcaria pale.

Long. 6-8.5 millim.

*Hab.* Deesa; common.

Comes into Bingham's key on p. 3 after *M. pectinospinata*, but is a much smaller species, and differs from it in many respects.

*Mutilla vincula*, sp. n.

♀. Head and thorax coarsely punctured, the punctures of the abdomen hidden by the pubescence; head as wide as thorax, the latter, when viewed from above, subquadrate, the edges rough, rounded posteriorly; abdomen shorter than the head and thorax united, second segment considerably wider than thorax; pygidium finely longitudinally striate. Black, the thorax and median segment in the centre above red, leaving a black basal and lateral margin when viewed from above; head, including scape of antennæ, with white pubescence, matted and decumbent, the red portion of thorax with sparse golden, below with white pubescence; abdomen velvety black, apex of first segment ciliated with golden,

second segment with two median spots of silvery pubescence, one at base and one at apex, the basal spot the larger, also two ill-defined lateral larger spots of more sparse white pubescence, not entirely covering the black; third segment with a band of white pubescence, narrowly interrupted in the middle, a little white pubescence on the sixth segment; all the segments below with fringes of white pubescence; the legs spinose, with white pubescence, the spines black, calcaria pale; the whole of the head, thorax and abdomen more or less covered with erect black hairs, longer than the pubescence.

Long. 11-12 millim.

*Hab.* Deesa; rare.

This species would come into Bingham's key on p. 4 next to *M. blanda*, but it is larger, the pubescent band on the third abdominal segment is interrupted in the middle, and the thorax is red only in the centre above, not at the sides.

*Mutilla argenteomaculata*, Smith.

♀. The thorax and second (not first) abdominal segment are, when carefully looked at with a lens, not red but black, though the short depressed golden pubescence makes them appear at first sight red; the white pubescent spots on the abdomen are as follows: one median on first segment, one median basal, one median apical, and two lateral on second segment, one median and two lateral on third, fourth, and fifth segments, of which the median spot on third segment is frequently obsolete.

♂. The white pubescent spots on the abdomen are as follows: median apical on second to sixth segments, lateral on apical margin of second segment (often obsolete); the whole of the basal half of the third segment is also covered with white pubescence.

These notes are taken from a considerable series of fresh specimens, while Bingham's description was probably taken from an old or worn example.

*Mutilla fumipennis*, Bingham.

A variety of this species has the basal half of the fore wing clear hyaline instead of deep yellow.

*Mutilla aversa*, sp. n.

♀. Head closely but somewhat shallowly punctured, thorax striate in the centre above, punctured at the sides and

between the striations; abdomen apparently finely punctured, but the sculpturing is more or less hidden by the pubescence; head massive, broader than the thorax, eyes small, not emarginate, head behind them wider than their length; clypeus short, its apex hidden in the type specimen by the mandibles; thorax of equal width throughout, sloped gradually upwards to the scutellum, where there is a row of conspicuous teeth, and from whence the median segment is steeply sloped downwards, forming almost a right angle with the rest of the thorax; abdomen non-petiolate, second segment wider than the thorax, but not or scarcely wider than the head; apical abdominal segment punctured, with a median longitudinal keel. Black, the head and thorax above red; head and thorax with sparse greyish pubescence, intermixed with a few black hairs; legs with grey or white pubescence, tibiae very spinose, tarsi inclining to rufous, calcaria pale; abdomen with somewhat dense black pubescence, a round spot at the apex of first segment, a semicircular one at the apex of second, and a similar smaller spot at the apex of third segment, white; the long hairs on the apical segment and at the sides of the abdomen grey.

Long. 8 millim.

*Hab.* Deesa; not common.

Comes into Bingham's key, section B, after *M. ocellata*, and is allied to Cameron's *M. persuasa*, but the row of teeth at the apex of thorax suffices to distinguish it from either.

### *Mutilla optima*, Smith.

♂. Stoutly built; head, thorax and abdomen closely punctured, the puncturing much hidden by the pubescence; head narrower than the thorax, eyes small, not emarginate; thorax subquadrate, median segment roundly truncate posteriorly; abdomen with the basal segment very short and narrow. Black, the mandibles in the middle, and the antennæ below, dark red; head, pronotum, scutellum, a broad basal band, emarginate in the centre on the second abdominal segment, and the whole of the third and fourth segments with silvery pubescence; legs sparsely spinose, the spines and calcaria black, the pubescence silvery, except on the mesonotum, median segment, apical portion of the second and the fifth and following segments, where it is black; wings with only two cubital cells, the radial cell very short and rounded at apex; fore wing with the basal three fifths subhyaline, with a flavous tinge, remainder subfuscous; hind wing hyaline at



base, becoming somewhat darker at apex; nervures dark testaceous, tegulæ black or reddish black.

Long. 6-9 millim.

*Hab.* Deesa.

I took a specimen of the above *in coitu* with a female which I think is without doubt Smith's *M. optima*, and I subsequently obtained a long series of both sexes. They vary a good deal in size, especially the female.

*Mutilla malinka*, sp. n.

♀. Head and thorax closely but not very deeply punctured, abdomen with fine and somewhat sparse punctures; head as wide as thorax, when viewed from above almost round, the eyes small; thorax subquadrate, roundly truncate at base, rounded at apex; abdomen pseudosessile, shorter than head and thorax united. Head, antennæ, thorax, legs and apical two or three abdominal segments light red; abdomen immaculate, basal three or four segments very dark brown, almost black, their apical margins red; pubescence greyish white, sparse but long, especially on the abdomen.

Long. 4 millim.

*Hab.* Deesa; a single specimen.

This species, having the abdomen immaculate, comes into Bingham's key on p. 8, near to *M. pulchrina*. It is, however, only about a quarter the length of that species.

*Mutilla officia*, sp. n.

♂. Head somewhat sparsely, pronotum and mesonotum more closely and deeply punctured, median segment coarsely reticulate; abdomen somewhat sparsely and shallowly punctured; antennæ as long as the head and thorax united, the third joint of the flagellum slightly longer than the fourth; the portion of the vertex between the ocelli much raised, eyes emarginate, head slightly narrower than thorax; pronotum truncate anteriorly, gradually widening towards tegulæ; mesonotum with two parallel longitudinal furrows; scutellum with a slight median furrow, median segment convex, roundly truncate posteriorly, first abdominal segment with a ventral tubercle. Head, thorax, and basal and apical abdominal segments black, with sparse grey pubescence intermixed with some black hairs; remainder of abdomen light red and shining, with golden pubescence; legs with grey pubescence, calcaria white. Wings light fusco-hyaline, paler, almost hyaline at base; three cubital cells, not extending beyond the apex of the radial cell, which is

short; measured on the cubital nervure, the first longest, second and third subequal; nervures and tegulæ black, the latter finely punctured.

Long. 12 millim.

*Hab.* Deesa; a single specimen.

This species comes into Bingham's key on p. 9 next to *M. Tornatorei* under a new sub-section, "second to sixth abdominal segments red."

*Mutilla kraciva*, sp. n.

♂. Head and thorax closely but rather coarsely punctured, the puncturing of the abdomen hidden by the pubescence; head small, not quite as wide as the thorax, eyes not emarginate, antennæ about as long as the head and thorax united; thorax transverse anteriorly, roundly transverse posteriorly, mesonotum and scutellum much raised, median segment rather steeply sloped; abdomen slightly petiolate, first segment with a ventral keel, pygidium transverse at apex. Black: head and thorax with white pubescence, which is somewhat long and matted, except on the mesonotum and scutellum, where it is sparse; first abdominal segment with an apical band of white, second, third, and fourth segments above entirely covered with thick bright golden-yellow pubescence, their apical margins, especially at the sides, ciliated with white hairs; fifth and sixth segments with large median round spots of white pubescence; second to fifth segments below with apical bands of white hairs, sixth and seventh segments above with black pubescence; legs moderately spinose, spines and calcaria black, pubescence white. Wings subfuscous, the basal half of fore wing lighter, with a slightly flavous tinge, base of hind wing subhyaline; three cubital cells, the radial cell short, its apex reaching to about the middle of the third cubital cell; nervures and tegulæ black, the latter punctured.

Long. 12 millim.

*Hab.* Deesa; one specimen only.

This handsome species would, according to Bingham's key, come on p. 9, somewhere near to *M. discreta*, but it is quite unlike that or any other species that I have seen.

*Tiphia exacta*, sp. n.

♀. Head and base of pronotum sparsely punctured, mesonotum almost impunctate; abdomen with a few shallow and scattered punctures; head, pronotum, mesonotum, scutellum and abdomen shining, median segment opaque, the latter

truncate apically, finely transversely striate, with three median longitudinal carinæ, slightly converging at apex, and reaching the verge of the truncation. Black, with sparse greyish pubescence; mandibles red in the centre; fore wing flavo-hyaline, hind wing hyaline, nervures testaceous, stigmata and tegulæ nearly black.

Long. 9 millim.

*Hab.* Kashmir, 5000–6000 feet. Three specimens.

This species is closely allied to my *T. conscia* described from Deesa in Journ. Bomb. Nat. Hist. Soc. vol. xiv. no. 1, p. 81. The latter should come into Bingham's key at p. 57 after *T. consueta*, and not as stated by me in describing it, as the tarsi are black, not testaceous. The present species is larger than *T. conscia*, the fore wing has a more decidedly flavous tinge, and the median segment is distinctly, though very finely, transversely striate, and not smooth.

*Myzine apimacula*, Cam.

♂. Head, thorax and abdomen sparsely punctured, shining, clypeus rounded anteriorly, the apex curved inwards, scarcely emarginate; head about the width of pronotum, which is transverse anteriorly, median segment narrower than pronotum, rounded at sides and apex; abdomen nearly half as long again as head and thorax united, almost pseudo-sessile, the petiole being extremely short, all the segments more or less constricted. Black: the clypeus anteriorly, two lateral spots at base of the pronotum and its apex narrowly, a spot on all the tibiæ at base, the tarsi, and transverse median spots on abdominal segments 2–5, with minute lateral spots on the same segments, pale yellowish white; mandibles, flagellum of antennæ, and apical three abdominal segments dark red; wings hyaline, nervures and stigmata testaceous, tegulæ pale yellow, with a black median spot.

Long. 9 millim.

*Hab.* Deesa.

This species would come into Bingham's key on p. 65 under a new subsection *a'*. "Abdomen black at base, red at apex." When Cameron described the female I had only taken that sex, but I subsequently obtained the male above described, which I feel sure is of the same species as the female described by Cameron in Journ. Bomb. Nat. Hist. Soc. vol. xiv. no. 2, p. 272.

*Scolia pila*, Nurse.

When I described this species in the Journ. Bomb. Nat. Hist. Soc. vol. xiv. no. 1, p. 82, I had not a specimen of  
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the female. I have now obtained that sex, of which the following is a description:—

Similar to the male, but more slenderly built, the head almost impunctate; clypeus with the centre much raised, shining; the ground-colour is dark red, and not black, the head, except the mandibles and antennæ, being entirely orange-yellow, and the markings on the thorax and abdomen of the same shade, and not bright yellow as in the male.

Long. 12–13 millim.

*Hab.* Deesa.

*Scolia vivida*, Smith.

The female of this species has not, I believe, been hitherto described.

Head smooth, except the portion of the front near the base of antennæ, which is somewhat closely but irregularly punctured, and a few punctures on the vertex near ocelli; thorax closely punctured, the punctures, especially those on the median segment, being shallow; abdomen impunctate. Dark red, the clypeus being somewhat lighter; a broad irregularly-shaped transverse band across the head in front of the anterior ocellus, reaching into the emarginations of the eyes, the vertex posteriorly, and the cheeks, yellow; the second, third, and fourth abdominal segments are black above, with broad median yellow bands, narrowed in the centre. Wings similar to those of the male. Pubescence on the red portion of the body and on the legs rufous, elsewhere greyish.

Long. 16–17 millim.

*Hab.* Deesa; not common.

*Elis rubricata*, sp. n.

♂. Head, thorax and abdomen pubescent, the pubescence on the former two hiding the sculpturing, the latter smooth and shining; clypeus convex, transverse anteriorly, bare and shining in the centre; median segment short, the sides rounded posteriorly; first abdominal segment long, subpetiolate, and much constricted. Black: the clypeus, except a large triangular spot in the centre, and a line on the anterior and intermediate tibiæ above, pale yellow; an obscure narrow apical band on first, wide apical bands on the second and third, the whole of the fourth, fifth and sixth, and the apex of seventh abdominal segments, dark red, the red band on the third segment emarginate in the centre; abdomen black below; pubescence hoary grey, except on the red portion of the abdomen, where it is fulvous red. Wings,



with two cubital cells, clear hyaline, nervures testaceous, tegulæ very pale testaceous; the costal margin of the fore wing has a very faint inclination to yellow.

Long. 15 millim.

*Hab.* Deesa; a single specimen.

This species would come in Bingham's key on p. 92 under a new heading "C." Male known, female unknown.

*Pseudagenia mutilata*, sp. n.

♀. Head, thorax, abdomen and legs sparsely pruinose; clypeus very convex, much broader than long, its apex much produced, the sides rounded; eyes slightly convergent above, median segment gradually sloped, the sides rounded; posterior portion of metanotum with a deep median longitudinal groove, continued on to the median segment, where it becomes shallow and inconspicuous; both these segments longitudinally striate, the former finely, the latter less finely; legs long, tibiæ and tarsi with minute spines. Head and thorax black; abdomen dark red; mandibles at apex, clypeus anteriorly, inner margin of the eyes narrowly, antennæ, anterior legs except the coxæ and the tegulæ, more or less red; intermediate and posterior legs reddish black; wings subhyaline, nervures testaceous, stigmata paler.

Long. 9 millim.

*Hab.* Deesa; a single specimen.

This species would come into Bingham's key on p. 108 under "C," new subsection "c." "Head and thorax black, abdomen red."

*Salix avidus*, sp. n.

♀. Smooth and shining, the median segment lightly transversely striate, second and third abdominal segments at base with minute and shallow punctures; head broader than thorax; clypeus very convex, its anterior margin raised and transverse; an impressed line from the antennal tubercles to the anterior ocellus; pronotum with its posterior margin slightly depressed; an obscure median longitudinal groove on the median segment. Black, with sparse and short silvery pile; apex of abdomen with long reddish hairs; wings flavo-hyaline, nervures testaceous, tegulæ black; tarsal claws unidentate.

Long. 12-14 millim.

*Hab.* Mount Abu; not common.

This species would come in Bingham's key on p. 126 after *S. verticalis*, in a new section "*c*<sup>2</sup>." "Entirely black."

[To be continued.]

LVII.—*Notes on Blattidæ &c., with Descriptions of new Genera and Species in the Collection of the British Museum, South Kensington.*—No. I. By W. F. KIRBY, F.L.S., F.E.S.

IN comparing my 'Catalogue of Blattidæ' with the Museum Collection I have found a considerable number of new species; and I herewith offer descriptions of a first instalment of species belonging to the subfamilies Panchlorinæ, Blaberinæ, Corydiinæ, Polyphaginæ, and Panesthiinæ.

BLATTIDÆ.

PANCHLORINÆ.

Genus RHYPAROBIA, Krauss.

*Rhyparobia thoracica*, sp. n.

Long. corp. 37 millim.

*Female*.—Black, the upper and hinder orbits narrowly bordered with red; the lower mouth-parts and the greater part of the centre of the abdomen above and below ferruginous. Tegmina testaceous subhyaline, with two reddish-brown shades: one lies below the scapular black basal streak and widens out, covering more than the outer half of the lower basal area, and extending beyond and bordering the anal nervure; the second brown area occupies about the middle of the left tegmen, extending to the inner margin, but not to the costa; on its upper part it becomes irregular and submacular, and there are several spots between it and the basal streak. Wings nearly hyaline, with pale nervures. Antennæ black; legs dark ferruginous, shading into blackish above. Abdomen rugose above towards the extremity; the terminal segment carinated as far as the incision in the middle of its hind border.

*Hab.* Ntunda, Shire River.

Allied to *R. Capelloi*, Bolivar, from the Quango.

BLABERINÆ.

Genus BLABERUS, Serv.

*Blaberus Distanti*, sp. n.

Long. corp. cum tegm. 60 millim.; long. pron. 8 millim.; lat. pron. 20 millim.

*Female*.—Head black, except the lower mouth-parts and the neighbourhood of the base of the antennæ; pronotum

rich tawny in front, the centre filled up with a large black figure, with irregular front and side borders, and slightly narrower below, where it unites with a deep black terminal band, which extends slightly upwards on the sides nearly to the middle; one or two indistinct tawny spots in the black figure; tegmina light tawny, broadly varied with darker, with the usual black basal line extending to two fifths of the length; abdomen above apparently tawny, with a broad black submarginal band on each side; underside generally tawny, abdomen with a festooned moderately broad submarginal black band on each side, meeting at the extremity.

*Hab.* —? (*Distant*).

Allied to *B. Sulzeri*, Guér. Guérin's description does not agree with Sulzer's figure of *B. surinamensis*, which is bad, and probably represents another species. *B. postica*, Erichs. (= *thoracica*, Sauss.), belongs to the same group.

#### CORYDIINÆ.

##### Genus CORYDIA, Serv.

##### *Corydia tonkinensis*, sp. n.

Long. corp. cum tegm. 18 millim. ; lat. tegm. 11 millim.

*Female*.—Closely punctured, pubescent; pronotum transversely oval, broadest at about two thirds of its length; pronotum and tegmina dark metallic green or blue, sometimes with purplish reflections on the hinder half of the tegmina; tegmina crossed beyond the middle by a fulvous band, expanded on the costa, and projecting towards the base in the middle, and on the inner margin; abdomen beneath violet-black, with the three subterminal segments tawny; antennæ black, slender, hardly moniliform, with about seven of the middle segments pale yellow.

*Hab.* Tonkin (*Fruhstorfer*).

Described from two specimens. This and the two following species appear to be somewhat intermediate between *Corydia* and *Dyscologamia*.

##### *Corydia purpuralis*, sp. n.

*Male*.—Allied to the last species, but rather longer and narrower. Pronotum and tegmina deep metallic greenish black, the costa shading into rich purple; tegmina with a large oval fulvous blotch on the costa beyond the middle, and a rather darker transverse band on the inner margin opposite extending half across the wing, beyond this the

tegmina are brownish towards the tip. Wings fusco-hyaline. Abdomen beneath fulvous, with the three subapical transverse segments and the apical segments shining black; the first of the former slightly and irregularly bordered with fulvous. Antennæ broken; the remaining basal segments moderately stout, black, submoniliform.

*Hab.* Kuatun, S.W. Fokien (*De la Touche*).

Allied to the last species.

Described from one specimen.

*Corydia hilaris*, sp. n.

Long. corp. 13 millim.; lat. abd. 7 millim.; exp. tegm. 27–30 millim.

Pronotum and base of tegmina deep metallic blue, the costal area for two fifths of the length, and the rest for nearly half the length, deep ochre-yellow, becoming more or less paler towards the tip. Wings yellowish hyaline, darker towards the costa, and with darker nervures. Abdomen orange, except at the base and tip, both above and below. Antennæ rather slender, submoniliform, black, with a pale yellow band occupying about three or four joints before the tip.

*Hab.* Not recorded (*Distant*).

Described from three specimens, 1 ♂, 2 ♀ ♀.

Allied to the last two species.

POLYPHAGINÆ.

Genus DYSCOLOGAMIA, Sauss.

*Dyscologamia cesticulata*, Sauss.

*Dyscologamia cesticulata*, Sauss. Rev. Suisse Zool. i. p. 298 (1893).

♂. Long. corp. 21 millim.; exp. al. 54 millim.

*Male*.—Head reddish brown, paler below, eyes contiguous, ocelli conspicuously yellow, and antennal pits yellow; antennæ, scape, and second joint yellow, the former with a broad black ring; the greater part of the flagellum brown, shading into pale reddish towards the extremity; pronotum thickly punctured, chestnut-brown varied with reddish, and clothed with long coarse reddish hair, transversely oval, with the sides rounded off; the rest of the upper surface of the body and the under surface and legs reddish; tegmina chestnut, the left paler towards the extremity, the costa bordered towards the base by an ill-defined blackish line, anal furrow marked by a slender pale yellow line, and intersecting a



large irregular pale yellow blotch on the inner margin; just before the curve of the furrow is a small black dash beneath it; the right tegmen almost bisected by an oblique brown line running towards the tip, which it does not reach; within this the tegmen is chestnut like the other, but outside it is subhyaline, darkest towards the line, and the cross-nervures towards the margin narrowly bordered on each side with white; the narrow anal furrow on crossing the transverse line is lost in a large triangular hyaline spot on the inner margin. Wings brownish hyaline, darkest towards the tips, the costa clouded with brown and rust-colour beyond the middle; most of the transverse nervures narrowly bordered with whitish. Supra-anal plate rounded, slightly incised in the middle; cerci rather long, moniliform.

Saussure's description relates to the female only; and I have nothing to add to it. His specimen was from Singapore; the Museum possesses both sexes from Selangor, and also two specimens of allied species from East and West Africa, which I do not care to describe without a longer series.

#### Genus POLYPHAGA, Brullé.

##### *Polyphaga camelorum*, sp. n.

Long. corp. 36–40 millim.; lat. abd. 28 millim.

*Female*.—Very convex. Dark chestnut-brown or blackish, shining; head varying from reddish chestnut to blackish, the antennal pits, the lower part of the labrum, the base of the labium, and a narrow space at the extremity of the latter, where it is triangularly incised, yellow; antennæ reddish, the basal half brownish; thoracic segments narrowly bordered with red and edged with long hairs; prothorax narrowly bordered with yellow on each side above, but not to the extremity; prothorax yellow beneath, with the border, and a broad space behind, reddish; meso- and metathorax beneath black, with a yellow space on the inner side; thoracic and abdominal sutures narrowly yellow; thorax and abdomen above thickly rugose-punctate, except a broad band at the base of each segment of the abdomen, which is black and shining, abdomen beneath smooth, reddish; terminal plate of abdomen above very broad, flattened, deeply and triangularly incised in the middle, and then sloping slightly to the outer angles, which are obtusely rounded off; the edge is set with short strong denticulations.

Two specimens from Hari Rud, and one from Badghis, collected by the Afghan Delimitation Commission.

"These were seen usually on sandy soil, where camels had been resting for the night, moving about amongst the dung."—*Dr. J. E. T. Aitchison*.

A very large and remarkable species, most nearly allied to *P. indica*, Walk. ; but *P. indica* is a smaller and darker insect, less shining, and with the last abdominal plate more rounded. A fourth specimen of *Polyphaga*, obtained by Dr. Aitchison at Badghis, agrees with a series from Kashgar, which should probably be referred to *P. indica*, the type of which is somewhat damaged.

*PANESTHIINÆ.*

Genus *SALGANEA*, Stål.

*Salganea dux*.

Long. corp. 43 millim. ; lat. pron. 17 millim. ; lat. abd. 22 millim. ; exp. al. 117 millim.

*Female*.—Dark reddish chestnut above, shading into blackish at the extremities and on the lower part of the clypeus ; under surface and legs of a lighter red ; head dark reddish brown, shining ; ocelli, labrum, and base of labium testaceous ; labium otherwise light red ; terminal plate of abdomen black above and below ; pronotum with a broad upcurved ridge, from whence rises a semidetached frontal hood, deeply indented in the middle ; pronotum thickly punctured, the central tubercles of the raised portion quite small, the outer ones rising into very large pyramidal but somewhat obtuse teeth ; meso- and metanotum with deep carinæ, enclosing a triangle very broad at the base and obtusely pointed behind ; the metanotum, and to a less extent the mesonotum, is obtusely and broadly angulated behind ; the meso- and metanotum and the basal segments of the abdomen smooth and very sparingly punctured, the last three abdominal segments and the terminal plate increasingly thickly punctured both above and below ; terminal plate, hinder half of the last segment of the abdomen, the extremity of the one preceding, and the cerci clothed with short testaceous hair ; seventh segment with the sides distinctly dentated, and with a large terminal tooth ; terminal plate rounded and entire, with only a strong tooth on each side just beyond the cerci. Front femora with only a terminal spine on the outer carina beneath. Tegmina and wings smoky brown, the extremities and the anal half of the wings smoky hyaline.

*Hab.* Obi (*Van Duivenborg*).

This fine species is evidently closely allied to, if not identical with, *S. ternatensis*, Brunn.; but as that species was described from another island, apparently from damaged specimens, and too briefly to admit of a proper comparison, I have decided to give a full description, and to treat it as provisionally distinct.

Genus MICRODINA, nov.

Centre of pronotum projecting over the head in a sort of hood, excavated in front, and tuberculate on the sides; the sides of the pronotum produced into large curving horns, with a strong blunt tooth at the base above; front femora unarmed, the penultimate segment of the abdomen slightly, and the last strongly dentated at the sides; terminal plate broad, rounded, and dentated, with a very large tooth beyond the cerci. Tegmina laterally rudimentary, as long as the metanotum.

Type *Panesthia forceps*, Saussure.

*Hab.* Pondicherry (*Sauss.*), Nilgiris.

Allied to *Salganea*, *Sauss.*, to which Saussure subsequently referred his *Panesthia forceps*; but differing in the remarkable structure of the pronotum, which is not unlike that found in some Dynastidæ among the Coleoptera, and by the rudimentary tegmina.

Saussure describes his insect as a female, but of six specimens now before me, one only, a male, agrees with his figure; in the others, which are females, the horns are shorter, and the concavity in front of the pronotum is shallower and more rounded. I may note that the antennæ are black for three fourths of their length, and then orange, shading into brown at the tip.

Genus DICELLONOTUS, Butl.

To this genus I refer the types *D. lucanoides* and *D. morsus*, Butl., *Panesthia monstrosa*, Wood-Mason, and *P. Panteli*, Bol., and two new species.

*Dicellonotus lævis.*

Long. corp. 50 millim.; lat. 22 millim.

*Female.*—Uniform black above; the labrum, the joints of the palpi, and the pulvilli ferruginous; the under surface of the antennæ, the greater part of the legs and of the under surface of the body, and the cerci more or less of a dark chestnut-red; terminal plate of abdomen black above and

below ; head smooth, very finely punctured, lower part of clypeus finely transversely striated ; front femora with four spines ; pronotum broadly and almost squarely concave in front, with the sides rising into short horns, narrowed and recurved at the summit ; front depression of the pronotum dull, finely granulated, slightly carinated in the middle, and with a slight ridge on each side ; the rest of the upper surface smooth and shining, sides of pronotum sparingly and finely punctured ; abdomen very slightly punctured, except increasingly on the last two segments and on the terminal plate, though even there much less coarsely and thickly than usual ; raised part of pronotum with two strong tubercles in front, nearly as wide apart as the horns, terminal segment with about six irregular teeth in the middle, most of which are short, broad, and obtuse.

*Hab.* Animalli Hills, S. India.

A narrower and much less strongly punctured species than the others of the genus.

*Dicellonotus insularis.*

Long. corp. 41–42 millim ; lat 22–24 millim.

Black, a line within each antenna, the labrum and labium (but not the mentum, which is black), and the pulvilli testaceous ; spines on legs, claws, and some shades on the under surface of the abdomen ferruginous ; front of pronotum curved up into a stout moderately long rounded horn on each side, separated by a rounded space ; frontal depression thickly punctured, with two parallel carinæ running to the raised part of the pronotum, which is strongly bituberculate in the middle in front, and with two shallow channels on each side in front ; it is nearly smooth, but is very slightly punctured, as are also the other divisions of the upper surface, till towards the hinder segments of the abdomen, where large rounded punctures become increasingly numerous to the extremity, especially on segments 6 and 7, and on the terminal plate, which is rather strongly, but broadly, dentated at the extremity. Tegmina lateral, extending as far as the base of the metanotum, narrowed and slightly upcurved at the extremity. Front femora with two spines.

*Hab.* Bara, W. Bouru.

Described from two specimens. The female is narrower, and the horns are less strongly developed than in the male. I place this species provisionally in *Dicellonotus*, but it differs from the types in possessing short tegmina.



## Genus PANESTHIA, Serv.

*Panesthia quinquedentata*, sp. n.

Long. corp. ♂ 19–25 millim.; ♀ 25–34 millim.

Apterous, deep black; the labrum and more or less of the under surface and legs in the male varying from rufo-testaceous to dark red; the female much less marked with red, and sometimes almost entirely black; pronotum with the front edge slightly raised in the female, leaving the head just visible, but scarcely at all in the male; it is slightly concave only in the largest female, in which specimen alone the usual two tubercles (large and wide apart) are visible in front of the raised part of the pronotum. The division between the lower front and the higher back portions of the pronotum is less slightly marked than usual. The front is depressed in the middle behind the ridge, and more coarsely punctured than on the sides of the thoracic segments, where the punctuation is extremely fine. The punctuation on the abdomen is slight, the punctures only becoming large and numerous towards the extremity and on the terminal plate. Terminal plate with five large teeth, two just behind the black cerci and three terminal. Front femora unarmed.

*Hab.* Nilgiris.

Probably allied to *P. ferruginipes*, Brunn., but in that species the terminal plate of the abdomen is described as ‘multi-crenulata.’ There are also a number of immature specimens, perhaps belonging to *P. quinquedentata*, judging by the structure of the abdomen, but they show no trace of the peculiar structure of the thorax. They are black, with more or less of the borders of the thoracic segments, the legs and under surface ferruginous. It is curious that most of these immature specimens are males, whereas the contrary is the case in the adult specimens.

*Panesthia javanica*, Serv.

The best series of this species at present in the Museum is from a doubtful locality (probably Burma), including four specimens of the male, a female, and a number of larvæ. The males exhibit a very interesting series of progressive development, varying in size from 34–47 millim., while the pronotum is scarcely more developed in the smaller specimens than in the female, while in the largest it is provided with very large horns, incurved and pointed at the tips. The larvæ agree with Penang specimens in having the red spots much larger than in typical *P. javanica*, and those of the

metanotum almost united. There are probably several species united under the name of *P. javanica* in various collections; but we require longer series, showing the various forms of the species from each locality, before this can be done satisfactorily.

*Panesthia æthiopis*, Stoll.

*Blatta æthiopis*, Stoll, Blatt. pl. 1 D. fig. 3 (1813).

*Hab.* Philippines.

This is a much larger and darker insect than the common *P. javanica*, Serv., with which it is usually considered to be synonymous.

*Panesthia ruficeps*, sp. n.

Size, shape, and general appearance of *P. javanica*, Serv.; front femora likewise trispinose, and the punctuation very similar. Differs as follows:—Dark brownish red, instead of black mixed with red; the centre of the pronotum, the terminal plate of the abdomen above and below, and the labium shading into blackish. Head otherwise light red (black in typical *P. javanica*), smooth and shining, clypeus below transversely striated. Tegmina rather lighter chestnut than in *P. javanica*. Pronotum in front with a distinct central carina in the male, but scarcely more excavated in front in the male than in the female.

Larva with more or less distinct oblique red marks on the meso- and metanotum, often curving round behind into a continuous band, and frequently with additional red marks on the sides.

*Hab.* Christmas Island.

The difference in the larvæ is quite sufficient to establish the claims of this insect to be regarded as a distinct species.

*Panesthia Tepperi*, n. n.

|| *Panesthia transversa*, Tepp. (nec Burm.), Tr. R. Soc. S. Austral. xvii. p. 125 (1893).

*Hab.* Port Darwin, Northern Territory of South Australia.

Differs, according to the description, from the other yellow-banded species of *Panesthia* in the band on the tegmina being interrupted.

*Panesthia morosa*, sp. n.

Long. corp. 26–28 millim.; exp. tegm. 48–53 millim.

Head and body black, a dot within each antenna, the

lower mouth-parts, the apical third of the antennæ, a spot on each side of the base of the abdomen, and the pulvilli yellowish or tawny. Front femora unarmed. Pronotum slightly concave on the front edge in the male. The front part is separated as usual by a curved depression from the raised hinder part, which is slightly bituberculate in the male. Abdomen covered with large depressed punctures; terminal plate with the hinder edge very slightly waved in the male, and scarcely at all in the female. Tegmina shining purplish brown, with the anal nervure narrowly yellow. Beyond the costal convexity is a paler space, crossed by oblique dark nervures. Wings smoky hyaline, with the costa and apex purplish brown.

*Hab.* Animalli Hills, S. India.

Allied to *P. plagiata*, Walk. (*inermis*, Brunn.), from Ceylon; but that species has a yellow band on the tegmina. The too brief description of *P. antennata*, Brunn., from Burma, might apply to this insect; but the former has spines on the front femora.

*Panesthia hilaris*, sp. n.

Long. corp. 32 millim.; exp. tegm. 62 millim.

*Female*.—Head smooth, black, face with a few fine punctures, eyes, ocelli, and antennal pits yellow, lower mouth-parts reddish, antennæ black, with a ring formed of two yellow joints at three fourths of their length; thorax above dark chestnut-brown, shading into blackish in front, except at the sides; metathorax light reddish; abdomen mostly black; under surface and legs mostly reddish chestnut. Prothorax with a rounded concavity on the frontal margin, leaving the vertex visible; front of prothorax sparingly punctured, with three shallow carinæ, the middle one very fine, converging behind, where a shallow lyrate depression, sparingly punctured, separates the front of the pronotum from the slightly raised and more thickly punctured hinder part. Front femora with a terminal spine beneath, and a preceding one on the left femur; pulvilli yellow. Abdomen with large depressed punctures; the terminal plate with larger and fewer punctures, the margin somewhat flattened, the extremity rounded. Tegmina yellowish hyaline, the basal third and a spot on the middle of the costa of the right tegmen, corresponding to a stripe on the left tegmen not reaching the inner margin; wings yellowish hyaline, darker towards the base, and lurid towards the costa.

*Hab.* Sandakan (*Creagh*).

Allied to *P. necrophoroides*, Walk., *mandarinea*, Sauss., &c., but differs from them in the colour of the antennæ and in the rounded terminal plate.

*Panesthia perfecta*, n. n.

*Panesthia australis*, Sauss. (nec Brunn.), Rev. Suisse Zool. iii. p. 323. n. 30 (1895).

*Hab.* New South Wales.

Differs from *P. australis* in the fully developed wings.

Genus MYLACRINA, nov.

*Female*.—Front of pronotum bordered by a raised rounded ridge, deeply and triangularly excavated in the middle; the surface rugose, the sides thickly punctured; two broad converging ridges running towards the raised hinder portion, which is furnished with a large tubercle on each side in front, and two in the middle; halfway between the front and hinder tubercles is a shallow depression. Upper surface of body sparingly punctured, except on the sides; but the sixth segment of the abdomen with large and numerous punctures; the seventh coarsely, and the terminal plate more finely, rugose. Fifth and sixth segments of the abdomen with distinct, though small, projecting lateral angles, that on the seventh larger, and slightly oblique, seventh segment twice slightly indented; terminal plate with numerous short blunt teeth. Tegmina lateral, subtriangular, rounded at the extremity, not much longer than the pronotum, and with large and numerous punctures. Wings not visible. Front femora with a strong curved spine at the extremity of the inner carina. Cerci short, rounded, set with fine reddish hair.

Differs from typical *Dicellonotus*, *Macropanesthia*, &c. in the presence of short tegmina, in the lateral projections on segments 5 and 6, &c.

*Mylacrina Wrayi*, sp. n.

Long. corp. 38 millim.; lat. 17 millim.

*Female*.—Black; antennæ, knees, and tarsi dark ferruginous, scape of antennæ, mouth-parts, and pulvilli lighter reddish, upper part of head black, smooth and shining, with a few very fine punctures.

*Hab.* Perak (*Wray*).



Genus *HETEROPLANA*, nov.

Differs from *Macropanesthia*, Saussure, in the presence of rudimentary tegmina and wings. Body broad; pronotum excavated in front, the excavation thickly and finely punctured, the front of the raised crest behind it with two tubercles near the middle. Body mostly smooth, but the abdomen with the sixth and seventh segments thickly covered with large depressed punctures, both above and below; seventh segment with a large securiform tooth, slightly pointing backwards, on each side at the extremity; terminal plate very closely and finely punctured above, and with large depressed punctures below; at the base on each side are two large teeth, the first raised; beyond these the extremity is strongly and regularly dentated. Front femora unarmed.

*Heteroplana Thomsoni.*

Long. corp. ♂ 28-35, ♀ 25-26 millim.; lat. corp. ♂ 17-18, ♀ 15 millim.; long. tegm. 8 millim., cum alis 11 millim.

Dark reddish brown, the antennæ, lower mouth-parts, and legs much redder; eyes honey-yellow; tegmina lateral, extending just beyond the extremity of the metanotum, uniformly broad for three fourths of their length, and then contracting rather suddenly; wings narrow, extending to beyond the first abdominal segment, and then curved up suddenly to an obtuse point, as are also the tegmina; the first tooth in the terminal segment of the abdomen upcurved, and clothed with short reddish hair.

Described from seven specimens (three males, four females) brought by Mr. Basil Thomson from the island of Aignan in the Louisiade Archipelago.

The insect has considerable resemblance to the figure of *Macropanesthia Mülleri*, Sauss., but the rudimentary wings of the male, and the difference in the shape of the appendages and crenulation of the last two abdominal segments, sufficiently indicate it as distinct.

## FORFICULIDÆ.

Additional note on *Labidura bidens*, Oliv.  
(*antèa*, p. 66. n. 16).

All the observations under this name apply to *L. erythrocephala*, Fabr. The true *L. bidens* is described as having a black head, and is not yet represented in the Museum.

LVIII.—On *Macrurous Crustacea* obtained by Mr. George Murray during the Cruise of the 'Oceana' in 1898\*. By W. T. CALMAN, D.Sc., University College, Dundee.

THE *Macrurous Crustacea* sent to me for examination by Mr. George Murray, F.R.S., are all of small size and all, with one possible exception, immature. Only one could be referred with any confidence to a species already described; but I have not thought it necessary to give more than brief descriptions of the solitary specimens of the other species. In addition, there will be found below some remarks on the characters and synonymy of the genus *Amalopenæus* and on the order of development of the gills in *Pasiphaea*. A specimen of *Sergestes* which proves to belong to a new species will be separately reported on by Dr. H. J. Hansen of Copenhagen.

#### Family Penæidæ.

##### *Amalopenæus elegans*, S. I. Smith.

*Amalopenæus elegans*, S. I. Smith, Rep. Crust. 'Blake,' Bull. Mus. Comp. Zool. Harvard, x. pp. 87-91, pl. xiv. figs. 8-14, pl. xv. figs. 1-5 (1882); Hansen, "Malacostraca marina Grœnlandiæ occidentalis," Vidensk. Meddel. fra den naturh. Foren. i Kjøbenhavn, 1887, p. 52; Ortmann, Decapoden u. Schizopoden d. Plankton-Expedition, pp. 27-28 (1893).

*Locality.* Lat. 52° 18' N., long. 15° 53' 9" W. Net no. 5 h. 1410 fath.† 21/11/98. One specimen.

The specimen recorded under this name is an immature male about 20 millim. in length, *i. e.* about two thirds of the length of the smallest specimen recorded by Smith, with whose excellent description and figures, however, it agrees minutely, except in the one detail, to which Hansen has already called attention, that the upper edge of the rostrum is microscopically serrate. The genital appendages of the first pair of pleopods ("petasma") are of small size and imperfectly developed, but the various lobes and processes indicated by Smith can all be identified. When first received the specimen (preserved in formalin) retained to a considerable extent the striking coloration referred to by Smith, the anterior appendages, and especially the maxillipeds, being more or less suffused with bright purple, while the marginal setæ of these limbs were of a brilliant scarlet.

\* See Journ. Geograph. Soc. vol. xiii. no. 2, Feb. 1899.

† The method of capture was that of *open* tow-nets in series; the depth given in relation to each net refers to the computed position of the net.

By recent writers the genus *Amalopenæus* of Smith has generally been regarded as synonymous with the earlier *Gennadas* of Spence Bate\*, and it has been suggested† that of the two imperfectly described species referred to the last-named genus by Spence Bate, *G. parvus*, and possibly also *G. intermedius*, may be specifically identical with *A. elegans*. Both Ortmann and Faxon‡, however, call attention to the important difference in the branchial formulæ assigned to these two genera. *Amalopenæus* was stated by Smith to possess only one podobranch, attached to the second maxilliped, in contradistinction to the closely allied *Benthesicymus*, where five podobranchs are present; for *Gennadas*, on the other hand, Spence Bate gives a formula agreeing in this respect with that of *Benthesicymus*. Ortmann, in recording *A. elegans* from the Plankton Expedition, states that his specimens agreed with those of Smith in this as in all other respects, and suggests that some error has crept into Spence Bate's formula for *Gennadas*. This solution of the difficulty might well have been accepted were it not that Alcock§, referring to *G. parvus* specimens from Indian seas, states that the genus, and by implication this species, does not differ from *Benthesicymus* in the number of its gills.

On account of the small size of the present specimen, the determination of its complete branchial formula is a matter of some difficulty; but it can be seen without doubt that it is devoid of podobranchs on the peræopods, and that in so far it agrees with *A. elegans* and differs from *G. parvus*. I am unable to point out any other characters of importance whereby it may be distinguished from the last-named species. Spence Bate's figure of the third maxilliped of *G. parvus* shows the ischial and meral joints subequal in length, while in our specimen, as in Smith's figure, the ischium is nearly twice as long as the merus; the eye-stalk is not more than one fifth of the length of the carapace (in Spence Bate's figure the proportion is about one third) and is proportionately slender, while the whole body is less robust than in the figure. None of these differences, apart from the branchial formula, are sufficient to decide the question of the specific distinctness of the two forms.

\* Ann. & Mag. Nat. Hist. (5) viii. p. 191 (1881), and Rep. Crustacea Macrura 'Challenger,' p. 339 (1888).

† Wood-Mason and Alcock, Ann. & Mag. Nat. Hist. (6) vii. p. 189 (1891), and Ortmann, *l. c.*

‡ "Stalk-eyed Crust. 'Albatross,'" Mem. Mus. Comp. Zool. Harvard, xviii. p. 208 (1895).

§ Cat. Indian Deep-Sea Macrura and Anomala, p. 45 (1901).

The evidence given below as to the late appearance of certain gills in *Pasiphæa* might, perhaps, suggest that the apparent absence of podobranchs in our specimen was merely a character of immaturity, were it not that Smith's much larger specimens, with which it agrees in this respect, appear to have been quite mature. All that can be said at present is that our specimen confirms the original account of the gill-formula of *Amalopenæus* and leaves undecided the question of its identity with *Gennadas*.

*Distribution.* *A. elegans* is recorded by Smith from various localities off the east coast of the United States at depths of 372-1632 fathoms; by Hansen from West Greenland (from stomach of a fish); and by Ortmann from the Sargasso Sea, 1300-1500 m. (closing tow-net), and south of the Cape-Verde Islands, 0-400 m. (vertical net). *G. parvus* was obtained by the 'Challenger' at numerous stations in the Atlantic and Pacific Oceans at depths of from 315-3050 fathoms, and is recorded by Alcock from the Bay of Bengal and the Arabian Sea at 738-1043 fathoms. *G. intermedius* was found by the 'Challenger' at the surface and at a depth of 1850 fathoms in the Atlantic.

#### Family Pasiphæidæ.

##### *Pasiphæa* sp.

*Locality.* Lat.  $52^{\circ} 27' 6''$  N., long.  $15^{\circ} 40'$  W. Net no. 4 k. 1670 fath. 20/11/98. One specimen.

The total length of the specimen is about 17 millim., of which the carapace occupies rather more than one third. The body is only slightly compressed. The rostrum has the form of a forwardly directed, compressed, triangular tooth extending to the middle of the length of the eye-stalks; it is continued backwards by a ridge on the dorsal surface of the carapace, rising slightly to form a low, obtusely triangular prominence at about one third of the length of the carapace from the front, and becoming obsolete posteriorly. The sides of the carapace present several obscurely marked ridges and impressed lines, a horizontal ridge running backwards along the branchial region being the most conspicuous. The sixth abdominal somite is about twice as long as the fifth. The telson is transversely truncated at the tip and is shorter than the exopod and subequal to the endopod of the uropods. The eyes are small, not wider than their stalks, the corneal surface obliquely placed, faintly pigmented, and with a blunt tubercle above on the inner side. The mandibles have no palp. The other mouth-parts agree closely with those of



*Pasiphæa*. The chelipeds of the first pair are shorter than the second, the merus has a few setæ on its lower edge, and the palm is but little longer than the fingers. The second pair have the merus armed with five spines on its lower edge and the chela is more slender and longer by one half than that of the first pair. The fourth pair of legs are a little less and the fifth pair a little more than one half the length of the third pair.

The gills comprise five pleurobranchs corresponding to the five legs, a minute papilliform epipod on the third maxilliped, and four simple processes representing arthrobranchs attached to the third maxillipæd and the first three legs, the most posterior being exceedingly minute. It is very probable that this rudimentary condition of the arthrobranchs is an indication of immaturity, for I find that in specimens of *P. sivado* of 20 millim. in length (*i. e.*, not more than one third of the adult size) the three arthrobranchs, which in the adult are well-developed gills\*, are represented by simple papillæ, while of the fifth pleurobranch, rudimentary in the adult, no trace can be detected. Although these specimens of *P. sivado* have assumed in most other respects the characters of the adult, there is no certainty that such is the case with the specimen now under consideration. All that can be said with regard to the latter is that while the absence of a mandibular palp and the characters of the other mouth-parts refer it to the genus *Pasiphæa*, as limited by recent writers, the deep rostral tooth, the truncate telson, and the relative sizes of the chelipeds seem to differentiate it from all the species at present included in the genus.

#### Family Acantheephyridæ (?).

*Locality*. Lat. 52° 18' 1 N., long. 15° 53' 9 W. Net no. 5 e. 1070 fath. 21/11/98. One specimen.

The single specimen, about 13 millim. in length, bears a general resemblance to the group of larval forms for which Spence Bate founded his genus *Caricyphus*, and in particular to his *C. gibberosus* †, with which it agrees especially in the broad laminar tooth with downwardly directed apex on the third abdominal somite. It differs in the stouter form of the body and in the relatively shorter carapace, which is only about one fourth of the total length. The rostrum is slender, slightly longer than the eyes, having seven teeth

\* See the figure by Claus, "Neue Beitr. z. Morph. der Crust.," Arb. Zool. Inst. Wien, vi. 1886, pl. iv. fig. 36.

† 'Challenger' Report, Macrura, p. 716, pl. cxxi. fig. 4.

above and one below. The number of gills could not be definitely ascertained, but there are five well-developed pleurobranchs and a single series of rudimentary arthrobranchs, as well as a series of epipods ceasing apparently on the third last leg. All the thoracic legs bear exopods, and the first two pairs are chelate.

Spence Bate's family Caryocyphidæ\*, being founded entirely on immature forms, cannot be sustained. It seems not unlikely that some at least of the species are larval Acanthephyridæ, and in the present instance the arrangement of the gills lends some support to this view.

*Distribution.* Various forms referred to the "genus" *Caricyphus* were taken by the 'Challenger' in the Pacific, and by the Plankton Expedition in the Atlantic, in all cases at or near the surface.

#### Family Paguridæ.

*Locality.* Lat. 52° 4' 5" N., long. 11° 20' 1" W. Net no. 1 b. 20 fath. 19/11/98. One specimen.

This specimen is a zoëa-larva at a stage in which none of the abdominal appendages are yet developed, although the telson bears seven pairs of spines instead of six as in the first stage of the Pagurid zoëa. It differs from the zoëa of *Eupagurus bernhardus* as described by Sars † in the shorter rostral spine and in the broader telson, the posterior margin of which is straight, not incised in the middle as in the earlier stages of that species, nor convex as in *Anapagurus chiroacanthus*.

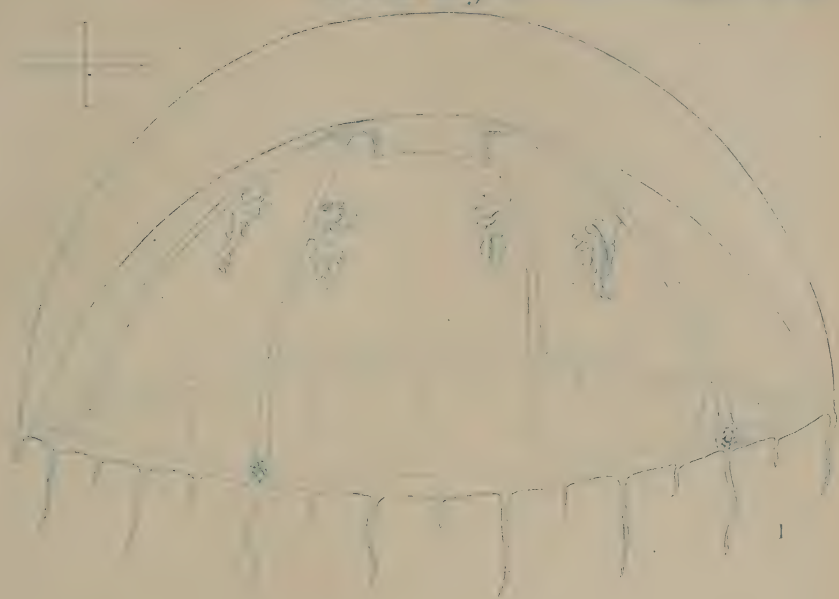
LIX.—*Report on the Cœlenterata from the intermediate waters of the N. Atlantic, obtained by Mr. George Murray during the Cruise of the 'Oceana' in 1898.* By R. T. GÜNTHER, M.A., Fellow of Magdalen College, Oxford.

[Plates IX. & X.]

ALTHOUGH a great deal of care was bestowed upon the collection and preservation of the material presently to be described, it was not easy to refer some of the individual specimens to their proper place in the system. Many of

\* *Op. cit.* p. 927, Appendix B.

† "Bidr. til Kundskaben om Decapodernes Forvandlinger," Arch. f. Math. og Naturvid. xiii. p. 146, pl. ii. (1890).



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the more delicate Hydrozoa lacked organs which must necessarily be examined before an unhesitating opinion with regard to their position in a classification can be formed. Their incompleteness was partly due to damage, almost inevitable when such flimsy creatures are removed from the depths of the Atlantic to an Oxford laboratory, and partly to their having been taken in November, at a season when senile decay has robbed them of organs characteristic of the prime of life earlier in the year.

Nevertheless, Mr. Murray's collection of the Hydrozoan fauna of the intermediate depths of the North Atlantic is quite sufficient to indicate some important and interesting facts of distribution.

The material was collected on the 19th, 20th, 21st, and 22nd of November, 1898, in various depths from 1770 fathoms to the surface, at about lat.  $52^{\circ} 20' N.$ , long.  $11^{\circ} W.$  to  $15^{\circ} W.$ , about 200 miles west of Valencia. The method of fishing has already been described by Mr. Murray in the '*Geographical Journal*.' Open tow-nets were towed in series at ascertained depths, and it was intended that the organisms common to the surface-nets and the deep nets should be subtracted from the total catch of the latter, so as to discount those organisms captured during the descent and ascent of the nets.

The method would be an absolutely perfect one if it were possible to rely upon the plankton of the various depth-zones being uniformly distributed during the interval of time which must necessarily elapse between the lowering and the raising of the series of nets. The obvious defect in the method is that it might lead to erroneous conclusions if the plankton be not uniformly distributed in a zone. The occurrence of particular species in dense swarms is a very well-known phenomenon, and it is not at all impossible but that open nets during their descent to the deeper waters might catch a great number of individuals of such a swarm which might be altogether missed by the nets following employed nearer the surface. However, although Mr. Murray's method is open to this objection, I think that the final results will show that it is a very useful and practicable one, and that even if a certain proportion of the results be discounted there will remain a balance in favour of Mr. Murray's main contention that the deeper intermediate waters of the ocean are inhabited by living organisms.

The details of distribution are set forth in the accompanying table. The figures in the fifth column show the number of individuals of all species captured in the nets

Analytical Table, showing the composition of the several hauls from the depths as stated.

Date, Nov. 1893.	Station.	Net.	Fathoms.	Specimens.	Species.	Anthomedusae.	Leptomedusae.	Narcomedusae.	Trachomedusae*.	<i>Aglantha</i> .	Medusae unidentified.	Siphonophora unidentified.	Monophyidae.	Diphyidae †.	Polyphyidae.	<i>Eudozia</i> .	Ctenophora.	Actinian Larvae.	Unidentified.	Salps.
19	Lat. 52° 4' 5" N., long. 11° 20' 1" W.	1 a	Surf.	2	1	..	..	..	..	..	..	2	..	..	1	..	..	..	..	..
		1 b	20	5	2	..	..	..	..	4	..	1	..	..	2	1	..	..	..	..
		2 a	Surf.	5	2	..	..	..	..	..	1	..	..	..	2	1	..	..	..	..
		2 b	270	1	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
		2 d	374	3	2	..	..	..	..	2	..	..	..	2	1	1	..	..	..	..
20	Lat. 52° 4' 5" N., long. 12° 27' W.	2 f	620	5	4	..	..	..	..	..	..	..	..	3	1	..	..	..	..	..
		2 g	650	2	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
		4 c	920	10	4	..	..	..	..	4	..	..	..	3	..	2	..	1	4	..
		4 d	1065	2	2	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..
		4 e	1170	17	6	..	..	..	..	11	1	..	..	1	1	..	..	..	..	..
20	Lat. 52° 27' 6" N., long. 15° 40' 0" W.	4 f	1275	31	7	..	1	..	1	23	1	..	..	3	1	..	..	..	..	..
		4 g	1370	1	1	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..



21	Lat. 52° 18'·1 N., long. 15° 53'·9 W.	4 <i>h</i> 4 <i>j</i> 4 <i>k</i> 4 <i>l</i>	1470 1570 1670 1770	25 8 12 2	5 4 6 2	.. .. .. ..	1 .. .. ..	.. .. 1 ..	18 3 6 ..	.. .. 2 1	.. .. 1 1	.. .. 2 1	3 .. 3	2 1	1 7 3 11 1 6 6 1 12 6	2 .. ..	2 4 5 3 4 .. 1 .. ..	3 .. 1 .. ..	1 4
22	Lat. 52° 20' N., long. 15° 7'·9 W.	6 <i>a</i> 6 <i>d</i> 6 <i>e</i> 6 <i>f</i> 6 <i>g</i> 6 <i>h</i>	150 375 440 510 560 610	2 1 2 4 10 1	2 1 2 3 4 1	.. .. .. .. .. ..	.. .. .. 2 <sup>p</sup> ..	.. .. .. .. 2 <sup>p</sup> ..	.. .. 1 .. 2 11 2	.. .. 1 .. 1 1 6 6 1 12 6	.. .. 2 1 1 6 6 1 12 6	.. .. 2 1 1 6 6 1 12 6	.. .. 2 1 1 6 6 1 12 6	2 .. ..	2 .. ..	2 .. ..	2 .. ..	2 .. ..	1 5 .. ..

† Except *Eudoria*.\* Except *Aglantha*.

at the depths indicated in the previous column. The figures in the next give the total number of species captured in the haul, and the remaining columns show the proportions in which different species or groups of species occur in each catch.

It must, of course, be remembered that the distribution of life indicated in the table may only hold good for the late season of the year, and it is desirable that other collections should be made at other seasons and by nets which could be opened or closed with certainty at any desired depth.

The table shows that the richest hauls were made from depths below 1000 fathoms. The results of 32 hauls were submitted to me for examination; 17 hauls were from above 1000 fathoms and 15 from below 1000 fathoms. The average number of Cœlenterate specimens from the deeper hauls was about 21, whereas about 5 (that is, only a quarter) came on the average from the hauls of less than 1000 fathoms. It will, of course, remain an open question whether any individual specimen was caught at a considerable depth or quite near the surface; but I think that the figures just given demonstrate conclusively that the deeper waters, *i. e.* below 1000 fathoms, are not less densely populated than the more superficial waters, and that they teem with Cœlenterate life. And when a particular species is repeatedly present in the deeper hauls but is entirely absent from the more superficial, it may be assumed to be peculiar to the deep water.

## ANTHOMEDUSÆ.

### Tiaridæ.

*Bythotiaræ Murrayi*, gen. et sp. n.  
(Pl. X. figs. 4 & 5.)

A single specimen of this interesting new form was obtained in a haul from a depth of 1610 fathoms in lat.  $52^{\circ} 18' 1''$  N., long.  $15^{\circ} 53' 9''$  W. It was nearly globular in shape and 7 millim. in diameter. In general characteristics, and in the disposition of the gonads upon the manubrium, this Medusa resembles the Tiarid Anthomedusæ; but whereas the four radial canals in the latter are said to be, so far as I know without recorded exception, simple, in the new Medusa they fork at a short distance from the base of the manubrium; so that at first sight it seemed as if this form really belonged to the Cannotidæ, but the genital ridges are distinctly inter-radial in position, having nothing to do with the radial

canals, and are upon the manubrium, as in the Anthomedusæ. At the end of each of the eight canals there is a tentacle.

I have therefore no hesitation in establishing a new genus for this Tiarid, which seems to belong to the deep intermediate waters or mesoplankton of the Atlantic Ocean.

BYTHOTIARA, gen. nov.

*Characters.* Tiarid with four radial canals, which bifurcate and open into the circular canal by eight adradial terminal branches. Four gonads arranged interrally along the manubrium.

*Bythotiara Murrayi*, sp. n.

Umbrella nearly as high as broad. Manubrium divided into two regions; the proximal part receiving the four radial canals is squarish in cross section, bearing the gonads in four ridges along the interradyal angles. The distal region is smallest, free from gonads. Mouth surrounded by four oral lips. Four radial canals bifurcate close to the manubrium. Eight long tentacles at the ends of the eight adradial terminal branches.

I have much pleasure in naming the species after its discoverer Mr. George Murray.

LEPTOMEDUSÆ.

Thaumantidæ.

*Laodice Chapmani*, sp. n. (Pl. IX. figs. 1, 2, 3.)

One specimen of this fine form was obtained in lat. 52° 18' 1 N., long. 15° 53' 9 W., between 1070 fathoms and the surface. It measured 17 × 12 millim. It differs from other species of *Laodice* hitherto described in the character and distribution of the gonads. The reproductive cells are developed upon four fimbriated processes of the subumbrella situated upon the course of the four radial canals at points rather nearer the manubrium than the umbrella margin in the proportion of 5 : 8. In *L. Chapmani* the gonads (fig. 2) are far more restricted to one point than in *L. cruciata*, *L. calcarata*, or even in *L. ulothrix*, in all of which Atlantic species they extend either to the manubrium or to the umbral margin.

Tentacles 32 in number. Over the junctions of the radial with the circular canal are four ocelli, each of which seems

to be provided with a central, clear, refringent, lenticular body surrounded by deeply pigmented cells (fig. 3).

The species is named after my former tutor, Mr. Edward Chapman, M.P., who, as Science Tutor and Fellow of Magdalen College, has done so much to promote the interests of natural science in Oxford.

#### Æquoridæ.

##### *Halopsis ocellata*, Agassiz (?).

Two Æquorid Medusæ were taken from between 1470 and 1275 fathoms and the surface. They were without gonads, but possessed a short manubrium, a well-developed velum, a very muscular subumbrella, 8 radial canals, and about 60 and 42 tentacles respectively. The diameter of each was 6 millim. Owing to the imperfect preservation of the specimens, it is difficult to refer them to their proper position with any degree of certainty, although they would seem, if mature individuals, to belong to the genus *Octocanna*.

I am rather inclined, however, to consider them as immature forms of *Halopsis*, since they bear a considerable resemblance to the young of *Halopsis ocellata* as described by Agassiz ('North-American Acalephæ,' fig. 148).

#### NARCOMEDUSÆ.

##### Solmaridæ.

##### *Solmaris* sp. (?).

Up to the present time this genus has been regarded as belonging to the southern rather than to the northern fauna; it is therefore a matter of considerable interest to find that the isolated case of a young *Solmaris* with 15 tentacles, recorded by Browne from Plymouth, has now been followed by others from 52° N. lat. from deep water. The 'Oceana' specimens were all taken in hauls from between 1300 and 1610 fathoms. The number of tentacles varied; six individuals having 28, 32, 32, 39, 40, and 43 tentacles respectively.

##### Cunanthidæ.

A Cunanthid (?) 11 millim. in diameter, with 12 tentacles and large tentacle-roots, was taken between 1670 fathoms and the surface.



## TRACHOMEDUSÆ.

## Geryonidæ.

*Liriope* sp. (?).

A single young specimen of almost spherical shape, 5 millim. in diameter, with four tentacles about 3 millim. long, was taken in a haul from a depth of 1275 fathoms on the 20th of November.

## Agauridæ.

*Aglantha rosea*, Forbes. (Pl. X. figs. 6-8.)

By far the most abundant Medusa captured by the 'Oceana' was an *Aglantha*. It was found in hauls from almost all depths, occurring in the greatest numbers in catches made below 1000 fathoms; but in hauls from between 1600 and 1700 fathoms it becomes less frequent. The interior of the bell was often full of Copepoda.

There is some difficulty in identifying the species on account of the absence of manubrium, tentacles, sense-organs, and gonads. On the other hand, the eight radial canals, the thimble-shaped muscular umbrella, and the highly characteristic cone-shaped summit ("Scheitel aufsatz") suggest that this Medusa is *Aglantha rosea*.

Browne found fully developed *A. rosea* in April and May in Valencia Harbour. Maas describes *A. digitalis* from the Plankton Expedition material collected in July in the North Atlantic in the latitude of the Orkneys and Shetlands. It seems possible that fully developed *Aglantha* may live near the surface during the summer months, but may sink into deeper waters with the advancing season, and may then lose their manubria, tentacles, and other organs.

A typical 'Oceana' specimen is shown in fig. 6. Fig. 8 represents the margin of the umbrella (*u.*), from which the velum (*v.*) has become detached, tearing away with it a number of notch-like depressions (*te.*), which afford us some indication of the number (about 80) of tentacles. The tear has occurred along the line of the circular canal.

The exumbrella is produced into a characteristic cone-shaped summit, which is a highly variable structure. The *Aglantha* shown in fig. 6 may be regarded as of the normal shape; but in many individuals the cone-shaped summit has dwindled to the condition depicted in fig. 7. In no case, however, did an 'Oceana' specimen exhibit the other extreme variation described by Maas in *A. digitalis*, in which the summit was larger than the rest of the bell.

*Jelly-masses.*

In hauls from 1670 and 1770 fathoms were lenticular masses of jelly 20 and 13 millim. in diameter respectively, which seemed to have been parts of the umbrella of some Medusa which had died, perhaps, in a higher stratum of water. I have thought their occurrence worthy of notice, because a problem to which future investigators should turn their attention is that of the degree of permanence of the jelly, which forms the bulk of many pelagic organisms, after death and in the middle depths of the ocean. It would be interesting, for example, to learn the extent to which such jelly-masses are the food of organisms living in the greater ocean depths.

## SIPHONOPHORA.

## CALYCOPHORÆ.

## Monophyidæ.

*Sphæronectes gracilis*, Hæckel.

Specimens of about 8 millim. in diameter were taken in hauls from depths of 510, 810, 1510, 1670, and 1770 fathoms.

*Doramasia picta*, Chun.

To this species belong three individuals in a haul from 1570 fathoms and three taken in the three hauls from 1170, 1190, and 1300 fathoms.

## Diphyidæ.

*Diphyes bipartita*, Costa.*Eudoxia campanula*, Leuckart.

A number of *Eudoxiæ* were present in hauls from below 810 fathoms and down to 1610 fathoms.

It seems that they are to be identified with the *Eudoxia campanula*, Leuck., which was caught in such large numbers in the North Atlantic during the Plankton Expedition. It has already been shown that this species is often present in large numbers in the deeper waters of the Mediterranean and in the North Atlantic. Their relative abundance is indicated by the following catches made by the 'Oceana':—

Between 810 fathoms and the surface, 6 individuals.

920	2
950	2
1070	4

Between 1190 fathoms and the surface, 5 individuals.

„	1300	„	„	3	„
„	1410	„	„	4	„
„	1470	„	„	3	„
„	1610	„	„	11	„

*Praya* sp. ?

Isolated bracts in hauls from between 375, 1510, and ? 1170 fathoms and the surface.

*Diphyopsis* sp. ?

Specimens referable to this genus were taken in hauls from the very varying depths indicated in the table of distribution.

Polyphyidæ.

*Vogtia pentacantha*, var. *levigatus*, nobis.

Isolated nectophores occur in the hauls from 620, 1275, and 1470 fathoms. In shape they resemble the nectophores of *Vogtia pentacantha*, Köll., but their margin is smooth, instead of being surrounded with spinous processes.

*Hippopodius* sp. ?

A damaged *Hippopodius* was found in the tube containing organisms taken between a depth of 1570 fathoms and the surface. The fragments must have belonged to a large species which might have been some 6 inches in length.

CTENOPHORA.

Beroidæ.

*Beroë ovata*, Esch.

A single specimen measuring 17 millim. long and 9 millim. in diameter was taken between 1510 fathoms and the surface.

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#### EXPLANATION OF PLATES IX. & X.

*Fig. 1.* *Laodice Chapmani*, sp. n.

*Fig. 2.* Ditto. Genital organ upon one of the radial canals (*r.c.*).

*Fig. 3.* Ditto. An ocellus seen from the side near the root of a radial tentacle (*te.*).

*Fig. 4.* *Bythotiarra Murrayi*, gen. et sp. n.

*Fig. 5.* Ditto. Diagram showing the bifurcation of the radial canals (*r.c.*) and their relation to the base of the manubrium and its genital ridges (*g.*).

*Fig. 6.* *Aglantha rosea*, with normally developed conical process upon the exumbrella.

*Fig. 7.* Ditto. Exumbrella with shrunken conical process.

*Fig. 8.* Ditto. Portion of umbrella margin near the termination of one of the radial canals (*r.c.*). The velum (*v.*) has partially separated from the umbrella along the line of the circular canal, and the zone of tentacular depressions (*te.*) has separated with it.

#### BIBLIOGRAPHICAL NOTICES.

*Zoological Wall-plates.* By Prof. Dr. PAUL PFURTSCHELLER.  
Pichlers, Witwe, and Son: Vienna and Leipsic. 1902.

JUDGING by the sample plates which have been sent us, the zootomic wall-diagrams of Prof. Pfurtscheller should find many purchasers in this country. They are obviously the outcome of a practical experience in the teaching of elementary zoological anatomy, and in small class-rooms would prove admirable adjuncts.

*Geological Survey of Canada. Contributions to Canadian Palæontology.*—Vol. VII. Part 2. *On Vertebrata of the Mid-Cretaceous of the North-west Territory.* By H. F. OSBORN and L. W. LAMBE. 4to. 84 pages; with frontispiece, 20 plates, and 24 blocks of text-figures. Ottawa, 1902.

I. *Distinctive Characters of the Mid-Cretaceous Fauna.*  
By HARRY FAIRFIELD OSBORN.

THE determination by the Canadian Survey of a Mid-Cretaceous and freshwater fauna, including fishes, batrachians, reptiles, and mammals, is a forward step of great importance in vertebrate palæontology. The Belly-River formation has been determined geologically to be Mid-Cretaceous, lying lower in the series than the Montana [?] and the Fort Pierre and Fox Hills groups, and lying above the Fort Benton and Dakota. The Belly-River vertebrate



fossils are apparently comparable with those from the Judith-River beds proper in Montana. The Judith-River beds of the Laramie group lie above the Fort Pierre and Fox Hills beds; but the Belly-River vertebrates, judging by the stages of vertebrate evolution, have older characters—that is, they present more primitive features than are found in those of the Laramie and the Fort-Benton groups. Mr. Osborn's provisional correlation of the formations (at page 9) is as under:—

Freshwater.	{ Paskapoo (no Dinosaurs).	} Fort Union.	
Brackish and freshwater.	} Edmonton.	{ Laramie and Judith River.	{ <i>Triceratops</i> , <i>Torosaurus</i> , <i>Dryptosaurus</i> , <i>Orni- thomimus</i> .
Marine.	{ Pierre and Fox-Hills group.	} Fox Hills. Fort Pierre.	
Fresh and brackish water.	} Belly River.	{ Montana expo- sures in part.	{ <i>Stereocephalus</i> , <i>Mono- clonius</i> , <i>Ceratops</i> , <i>Trachodon</i> , <i>Deimo- don</i> , <i>Ornithomimus</i> , <i>Compsomys</i> , <i>Ptilodon</i> .
Sandy clays and sandstones.	} 910 feet.	Niobara.	
	Fort Benton.	Fort Benton. Dakota.	

It has yet to be determined whether or not all the fossils recorded as from the Judith-River beds are from Montana or from the Laramie group.

The geological succession of the groups according to the Geological Survey appears to be as follows:—

Laramie { Paskapoo (Eocene Tertiary).  
Edmonton (Upper Cretaceous).  
Fort Pierre and Fox Hills.  
Belly River.  
Niobara and Fort Benton.  
Dakota (with an Upper Cretaceous flora).

“The conclusion is that the Belly-River fauna is more ancient in character, both as to the older types of animals which it contains and as to the stages of evolution [shown] among animals which are also represented in the Laramie. The geological interval represented by the Fort-Pierre and Fox-Hills marine beds was accompanied by the extinction of certain Jurassic types and progressive evolution of persistent types. Finally, the fossil vertebrates, hitherto described from Montana, probably are, in part at least, of Mid-Cretaceous or Belly-River age” (page 21).

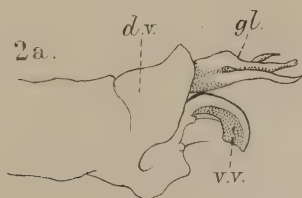
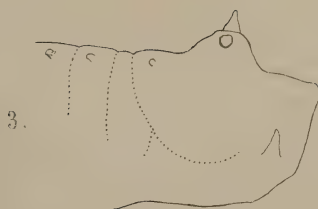
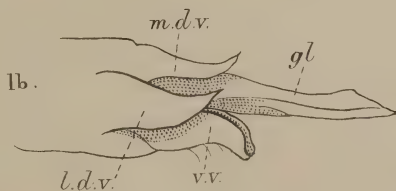
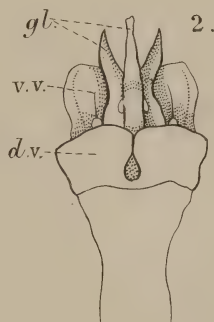
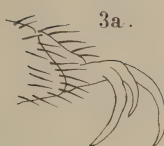
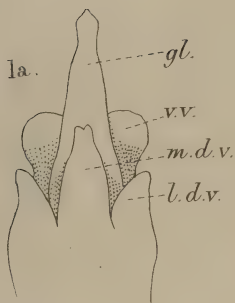
Details of the fossils are given at pp. 16-21 and tables of relationship and distribution at pp. 10-15.

II. *New Genera and Species from the Belly-River Series*  
(Mid-Cretaceous). By LAWRENCE M. LAMBE.

The history of geological research by the Canadian Surveyors in the Belly-River district is explained at pp. 25-28, and then, at pp. 28-81, detailed descriptions are given of five fishes, one batrachian, twenty-six reptiles, and three mammals—altogether thirty-four, of which eleven are new. There are two short comparative tables of generic features of *Monoclonius* and *Polygonax* at p. 68 and specific of *Trachyodon* and *Pteropelyx* at p. 77.

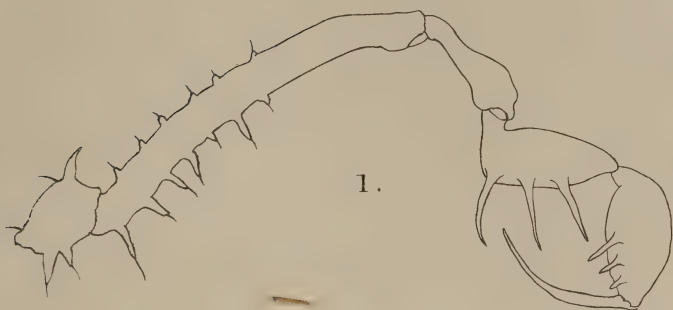
*The Evolution of the Northern Part of the Lowlands of South-eastern Missouri.* By C. F. MARBUT, Professor of Geology. Pp. vii & 63; 7 plates of views and maps. 8vo. Published by the University of Missouri. 1902.

THIS memoir belongs to vol. i. of 'The University of Missouri Studies.' It is very properly directed to the description and explanation of a portion of the State itself. This south-eastern part abuts on the western bank of the Mississippi below its junction with the Missouri River and above that with the Ohio. The northern part of the area is occupied by belts of low lands and ridges of no great height; it is limited on the west by the Ozark limestone-range. The relative levels and breadths are very carefully recorded, and their surface-characters are indicated by a few photographs in plates i. and ii.; and pl. iii. gives an admirable view of a crowded, melancholy, water-logged cypress-swamp. To show how the natural drainage of the country is traceable through its many changes, by the silting and banking-up of the rivers and the changes of their channels, is the object of the author, who, with his friends, has taken great pains to show that the Mississippi is now occupying its third successive channel, having been modified more than once by its junction with the Ohio River. Necessarily the relative hardness and softness of the strata composing the district have been important factors in this history, and so also has been from time to time the influx of water at the close of glacial periods. The Trenton Limestone (Lower Silurian) is at the base, constituting also the flanking Ozark territory, and seen in the bed of the Mississippi (pl. ii.). After the period of this being uplifted and eroded, Tertiary strata, as clay (Idalia), sands (Benton), and gravels (Princeton), came to be deposited there; and after a while the valley-deposits, namely, the Lafayette sands and gravels, the Loess, and the Terrace loam. The local distribution of all of these is shown by the map pl. vii.



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# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

No. 65. MAY 1903.

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LX.—*Fifteen new Species and Two new Genera of Tropical and Southern Opiliones.* By R. I. POCKOCK.

[Plates XI. & XII.]

### Family Phalangiidæ.

Genus PRIONOSTEMMA, nov. nom.

(For *Prionomma*, Loman, 1902, preocc. by White in 1835 for a Longicorn beetle.)

*Prionostemma insculptum*, sp. n.

♂.—*Colour.* Dorsal surface yellowish or blackish brown, sometimes the black, sometimes the yellow predominating, no median band; ventral surface marbled black and brown; femora of legs mostly blackish; palpi blackish, paler distally.

*Dorsal surface* densely sculptured with close-set pits, separated by a close reticulation of ridges. *Ocular tubercle* high and vertical in front, higher here than it is wide; mesially grooved above and on each side of the groove beset with numerous irregularly arranged small tubercles. The *dorsal scute* without trace of segmentation.

*Palpi* studded with small tubercles and short hairs; patella a little shorter than tibia, its process short, conical, about one

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sixth the length of the segment; tarsus about twice as long as tibia.

*Legs* with femora finely spicular; coxæ granular, with marginal tridenticulate, columnar tubercles. *Genital plate* granular.

Abdominal *sterna* sparsely granular.

Total length about 3 millim.; femur of first leg 5, of second 8 (entire appendage about 34), of third 4·5, of fourth 7.

*Loc.* Venezuela: Merida.

Specimens from the same locality which I regard as the females of the above-described males are larger, reaching 5·5 millim. in length, and have a pale median, sometimes †-shaped dorsal band, and the legs more annulate.

*Prionostemma scintillans*, sp. n.

♀.—*Colour.* Trunk a tolerably uniform blackish or dark brown, with a metallic golden marginal patch on each side of the fore part of the carapace, a similar one on the outer side of the distal portion of the coxa of the fourth leg, and two on the second free tergite of the abdomen; ventral surface, mandibles, palpi, and legs yellowish, with the exception of the trochanter and extreme base of femur, which are blackish.

Structurally closely allied to the preceding species; the *dorsal surface* similarly sculptured; but the *ocular tubercle*, which is rather lower, is nearly smooth above and furnished only with a small and inconstant number of irregularly disposed denticles, a single anterior pair being the only ones of invariable occurrence.

Length 4·5 millim.

♂.—Resembling female in colour and other characters, but smaller.

Total length barely 4 millim.; femur of first leg 11, of second 16 (length of entire appendage about 55), of third 11, of fourth 13.

*Loc.* Guatemala: Barrancos, Guatemala city (*O. Stoll*).

*Prionostemma bicolor*, sp. n.

♂ ♀.—Very nearly allied to *P. scintillans*, but differing in colour; dorsal scute yellowish brown, obscurely mottled, about the same tint as femora of the legs, the carapace with a suffusion of gold; mandibles and palpi yellowish brown; genital plate and the abdominal *sterna* much paler yellow; coxæ and trochanters of the legs deep brownish black and contrasting with the paler dorsal and ventral areas; the membrane between the trochanter and coxa greyish white.



*Measurements in millimetres.*—♂. Total length 3; femur of first leg 9, of second 16 (entire appendage about 50), of third 10, of fourth 13.

*Loc.* Guatemala: the Barrancos, Guatemala city (*O. Stoll*).

*Prionostemma citrinum*, sp. n.

*Colour.* Dorsal surface pale (almost lemon-) yellow, with the ocular tubercle black, and a longitudinal black stripe on each side of the abdominal shield; palpi, coxæ, and sternal surface also yellow, trochanters black, legs dark blackish brown; mandibles yellow proximally, blackish distally; apex of maxillary process of first leg black.

*Dorsal surface* closely granular; *ocular tubercle* as in *P. insculptum*; ventral surface and coxæ much less granular than in the foregoing species; the coxæ without distinct marginal tubercles.

*Palpi* much smoother than in the other species; the patellar process shorter and blunter.

*Measurements in millimetres.*—Total length 3.5; femur of first leg 10, of second 17 (entire appendage about 78), of third 9, of fourth 13.5.

*Loc.* Brazil: Lages.

The species here referred to *Prionostemma* differ from the two species described by Loman (*Zool. Jahrb. Syst.* 1902, pp. 178–179) in the weakness of the denticulation of the ocular tubercle and the shortness of the patellar apophysis. They may be distinguished as follows:—

- a. Carapace and dorsal scute with sculpturing of pits and ridges.
  - a<sup>1</sup>. Ocular tubercle nearly smooth, with only a few granules.
  - a<sup>2</sup>. Coxæ yellow, that of fourth leg with golden patch; dorsal surface dark .... *scintillans.*
  - b<sup>2</sup>. Coxæ blackish, no golden patch on fourth; dorsal surface pale ..... *bicolor.*
  - b<sup>1</sup>. Ocular tubercle with numerous small denticles ..... *insculptum.*
- b. Carapace and dorsal scute with granular sculpturing.
  - a<sup>3</sup>. Ocular tubercle weakly and irregularly denticulate; patellar apophysis much shorter than half the length of the segment .... *citrinum.*
  - b<sup>3</sup>. Ocular tubercle strongly and regularly denticulate; patellar apophysis equal to half the length of the segment ..... *coronatum & unicolor,*  
Loman.

## Genus PANTOPSALIS, Sim.

In the Proc. Zool. Soc. 1902, ii. pp. 399-400 (published April 1903), I described two new species of this genus, *P. albipalpis* and *P. nigripalpis*, and suggested that the former was perhaps based upon the male of *P. Listeri*, White. I also referred to a specimen, collected by Mr. Jennings at Maungatua, as the female of *P. nigripalpis*. This specimen, however, turns out to be a male. Hence the supposition that the differences between *P. Listeri* and *P. albipalpis* are of a sexual nature proves to be without the foundation that was claimed for it; and I am compelled to regard the above-mentioned example from Maungatua as the representative of a new species. This I have described below, in addition to two new forms received since the printing of my paper in the P. Z. S.

*Pantopsalis coronata*, sp. n.

*Colour* mostly black, but the last segment of the carapace and the first tergite of the abdomen ornamented with a bright transverse orange-red band; second segment with a mesially interrupted pale band, the rest with a narrow chalky-grey band; palpi paler than the rest of the appendages, reddish brown, with the distal half of the tarsus yellow; forceps of the mandibles also yellowish brown.

*Carapace* smooth, with at most a few tiny granuliform spicules; ocular tubercle also almost entirely smooth, one or two minute spicules on its posterior portion.

*Terga* and *sterna* of *abdomen* smooth.

*Coxæ* of *appendages* smooth.

*Palpi* smooth, studded with short hairs; femur about as long as patella+tibia; tarsus longer than patella+tibia by one third of its length.

First and second segments of *mandibles* beset with sharp spiniform tubercles, the tubercles fewer on the inner side; the basal segment exceeding in length the width of the carapace and rather longer than the body, subcylindrical; the second segment of about the same length, gradually incrassate distally, about five or six times as long as its distal thickness; the digits each armed with one strong tooth and some apical denticles; the denticles on the immovable digit borne upon an eminence.

*Femora* of *legs* (? of fourth) sparsely spicular; patellæ apically spicular; tibia of second composed of four subsegments; femur of first a little longer than basal segment of mandible.

*Measurements in millimetres.*—Total length 3·8; width of carapace 2·5; length of basal segment of mandible 4·5, of second segment 5; femur of first leg 5·5, of second 9, of third 5; first leg about 23.

*Loc.* New Zealand: Timaru in Canterbury (*C. H. Tripp*).

For the type of this and of the following species of *Pantopsalis* from Timaru I am indebted to Mr. F. F. Laidlaw, of Owens College, Manchester. Both specimens were collected by Mr. C. H. Tripp, after whom I propose to name the subjoined species.

*Pantopsalis Trippi*, sp. n.

♂.—Very nearly related to the foregoing, but without the orange-red band on the abdomen, the palpi more infusate, and the forceps of the mandibles not so noticeably reddish.

*Carapace* with about half a dozen strongish spicules in front.

*Mandibles* much longer than in *P. coronata*; first segment nearly four times as long as the width of the carapace and longer than the femur of the first leg by at least one third of its length; the second segment a little longer, its distal fourth incrassate.

*Measurements in millimetres.*—Total length (contracted) about 3; width of carapace 2·5; length of first segment of mandible 9·5, second segment 10·5; femur of first 6, of third 5, of fourth 8; length of first leg 25.

*Loc.* New Zealand: Timaru in Canterbury (*C. H. Tripp*).

*Pantopsalis Jenningsi*, sp. n.

*Pantopsalis nigripalpis*, Poc. P. Z. S. 1902, ii. p. 400, ♀.

♂.—*Colour.* Body blackish, all the appendages a deep blackish brown, with faint annulations on the legs.

*Carapace* with its median frontal area studded with sharp denticles; ocular tubercle with two rows of minute denticles.

*Mandible* with its basal segment about twice as long as the palpus and shorter than the femur of the first leg; second segment incrassate, about six times as long as wide; both segments studded with sharp tubercles.

*Measurements in millimetres.*—Width of carapace 3; length of basal segment of mandible 5, of second segment 6; femur of first leg 7·5, of second 13, of fourth 10.

*Loc.* New Zealand: Maungatua in Dunedin (*J. V. Jennings*).

The type of this species was wrongly determined as a female, and referred to one of the forms of *P. nigripalpis*.

It is a male, and differs from the male of *P. nigripalpis* in the characters pointed out in the subjoined tables.

*Synopsis of the Species of Pantopsalis.*

- |                  |  |                           |
|------------------|--|---------------------------|
| a.               | Mandibles shorter, basal segment shorter than femur of first leg and about as long as palpus.                  |                           |
| a <sup>1</sup> . | Carapace and ocular tubercle smooth; anterior end of abdomen with broad transverse red stripe.                 | <i>coronata</i> , sp. n.  |
| b <sup>1</sup> . | Carapace studded with spiniform tubercles on its frontal portion; no red stripe on abdomen.                    |                           |
| a <sup>2</sup> . | Palpi uniformly black  | <i>Jenningsi</i> , sp. n. |
| b <sup>2</sup> . | Palpi uniformly yellow   | <i>Listeri</i> , Wh.      |
| b.               | Mandibles very long, basal segment much longer than femur of first leg and about twice the length of the palp. |                           |
| a <sup>3</sup> . | Ocular tubercle and carapace almost smooth (palpus paler than legs, its tarsus yellow in the distal half)      | <i>Trippi</i> , sp. n.    |
| b <sup>3</sup> . | Ocular tubercle and frontal area of carapace studded with fine sharp denticles.                                |                           |
| a <sup>4</sup> . | Palpi uniformly blackish   | <i>nigripalpis</i> , Poc. |
| b <sup>4</sup> . | Palpi uniformly yellow   | <i>albipalpis</i> , Poc.  |

If in the future it be discovered that the males of the species of *Pantopsalis* are dimorphic as to their mandibles, growing them either long and thin or short and thick, the number of species at present referred to the genus will perhaps be reduced to one half by the union of the pairs of species classified together in the following alternative table:—

- |                  |  |                      |
|------------------|--|----------------------|
| a.               | Carapace and ocular tubercle almost entirely without spicules.         |                      |
| a <sup>1</sup> . | Mandibles long   | <i>Trippi</i> .      |
| b <sup>1</sup> . | Mandibles short  | <i>coronata</i> .    |
| b.               | Carapace and ocular tubercle studded with spicules, at least in front. |                      |
| a <sup>2</sup> . | Palpi yellow.  |                      |
| a <sup>3</sup> . | Mandibles long and slender   | <i>albipalpis</i> .  |
| b <sup>3</sup> . | Mandibles short and thick  | <i>Listeri</i> .     |
| b <sup>2</sup> . | Palpi uniformly blackish.  |                      |
| a <sup>4</sup> . | Mandibles long and slender   | <i>nigripalpis</i> . |
| b <sup>4</sup> . | Mandibles short and thick  | <i>Jenningsi</i> .   |

Genus PHALANGIUM.

*Phalangium Bettoni*, sp. n.

♀.—*Colour* olive-yellow, with black pigment in the depression on the carapace and black spots laterally on the abdomen; mandibles yellow, marbled with brown; palpi yellow, banded with blackish; legs with femora and tibiæ distally infusate and patellæ black in front.



*Dorsal scute* very finely and closely granular, the segments marked by transverse rows of small spicules; a few spicules on the sides of the carapace and many more in front, those in front of the tubercle arranged in two rows uniting behind midway between the tubercle and the anterior border, an isolated denticle in the middle of the lateral border. Ocular tubercle armed on the summit with two pairs of largish denticles, behind with one pair, and in front with two small denticles on one side, four on the other, all pointing upwards.

*Mandibles* unarmed except for three or four denticles in the middle of the upperside of the first segment.

*Palpi* unarmed; inner surface of patella and tibia studded with short erect hairs; the distal angle of the patella rounded and slightly produced.

*Legs* with femora and patellæ armed with serially arranged spicules; tibiæ compressed, quadrangular in section, with hairy edges.

*Measurements in millimetres.*—Total length 9; width of head 4; length of palp 6; femur of first leg 4, second leg 7, third 4, fourth 6; total length of first leg 20.

*Loc.* British East Africa: El donyo eb Urru, on the Mombasa-Uganda Railway (*C. S. Betton*).

This species may be at once distinguished from the South-African species *P. Leppanæ*, Poc. (*P. Z. S.* 1902, ii. p. 392), by the much smaller dorsal denticles, the smoothness of the coxæ, the slight production of the inner apex of the patella of the palp, &c.

### Family Triænonychidæ.

#### Genus SORENSENELLA, Poc.

[*Proc. Zool. Soc.* 1902, ii. p. 409 (April 1903).]

#### *Sorensenella bicornis*, sp. n. (Pl. XI. figs. 3, 3 a.)

♀.—*Colour.* Body blackish, median area of scute clearer reddish; palpi reddish; legs olive-black, obscurely ringed with paler markings.

Anterior portion of *dorsal scute* with a single long suberect spike near its antero-lateral angle; no tubercles on its anterior border apart from those that project between and on each side of the mandibles, and no spiniform tubercles above the base of the second leg. Ocular spike higher than in *S. prehensor*. First segment (carapace) of dorsal scute defined behind by a conspicuous procurved groove; the second, third, fourth, and fifth defined by feeble grooves and low tubercles; the

second antero-posteriorly constricted in the middle and, like the third, with a pair or two pairs of weak tubercles (grains); fourth with a pair of much stronger submedian tubercles and some weaker ones at the side; fifth with a transverse row of tubercles, of which two are larger but more wide apart than those of the fourth; sixth with a row of weak tubercles some distance in front of the posterior border of the scute, with a shallow transverse groove running just behind them. First and second free abdominal *tergal plates* also with a weak groove and weak row of tubercles, third more coarsely and numerous tubercular. *Sterna* grooved and tuberculated.

*Palp.* Trochanter with 1 long and 1 short spine below; femur with 6 spines below, the fourth and sixth the shortest, third the longest; 6 + 2 spines above and 3 on the inner side; tubercular externally; patella with 2 long internal spines; tibia with 4 internal and 5 external, whereof the first and third are small and subtubercular, this segment also with scattered tubercles; tarsus with 3 pairs of very long spines, also 1 small proximal spine on outer side and 1 small distal tubercle on each side.

*Legs* as in *S. prehensor*; the lateral branches of the claws of third and fourth legs almost twice as long as the median branch. (Pl. XI. fig. 3 a.)

♂.—Like the female, but with dorsal area flatter, less convex longitudinally.

*Palpi* longer and stouter, with the spines shorter, except one on the inner surface of the femur, which is very long, crossing its fellow of the opposite side in front of the mandibles, when the two palpi are approximated.

*Measurements in millimetres.*—♀. Total length 6; palp 5; first leg 7, second 12, third 11, fourth 8 (approx.).

*Loc.* New Zealand: Christchurch (*Arthur Dendy*).

This new species and *S. prehensor* (the only other species of this genus that has been discovered) may be compared as follows:—

- |    |  |                          |
|----|--|--------------------------|
| a. | Carapace with two small tubercles near the middle of its anterior border and three spines on each side; spine on ocular tubercle low, not higher than long; dorsal tubercles coarser ..... | <i>prehensor</i> , Poc.  |
| b. | Carapace without anterior submedian tubercles and with only a single long spine on each side; ocular spine higher than its basal length; dorsal tubercles weaker .....                     | <i>bicornis</i> , sp. n. |

With regard to the claws of the third and fourth legs of the Triænonychidæ, it may be observed that the suppression

of the small lateral branches seen in *Tricenonyx* or *Acumontia* would lead to the one claw of the Plagiostethi, whereas the suppression of the median branch and the extension of the median cleft to the base of the claw in *Sorensenella* would yield the two-clawed condition seen in the Mecostethi.

Genus ACUMONTIA, Loman.

In the Proc. Zool. Soc. ii. pp. 405-409, for 1902, I described two new species and one new subspecies of this Mascarene genus, basing them for the most part upon a few rather badly preserved specimens recently received from Dr. Forsyth Major. What were presumed to be the males and females of the two species were described, and attention was drawn to a peculiarity in the structure of the protarsus of the first leg of the supposed female specimens. Additional and better-preserved material received during the passage of that paper through the press has convinced me that I fell into error in the following particulars:—Firstly, the distal emargination of the first protarsus is not a female, but a male character of some species, e. g. *A. Majori*, though not found in the males of *A. rostrata*; its absence in the male of *A. rostrata* and its presence in what were regarded as the females of this species were the causes of the errors in sexual determination that I made: secondly, the specimen described as the female of *A. rostrata* is the male of another species: thirdly, the specimens described as *A. Majori* probably represent the sexes of two distinct species: fourthly, the specimens described as *A. rostrata* subsp. *Covani* are males and females of a form which must be regarded as a valid species.

*Acumontia rostrata*, Poc. (Pl. XI. figs. 2, 2 a.) : -

*Acumontia rostrata*, Poc. P. Z. S. 1902, ii. p. 405, ♂ nec ♀, text-fig. 82 A nec B.

The female of this very distinct species is unfortunately unknown. The penis of the male terminates in a tridentate glans retractile between an upper and a lower valve; the upper is double, being mesially cleft to its base, the lower is strongly curved and furnished beneath on each side with two strong setæ.

*Acumontia echinata*, sp. n.

*Acumontia rostrata*, Poc. P. Z. S. 1902, ii. p. 407, ♀, text-fig. 82 B.

♂.—*Dorsal scute* more closely granular than in *A. rostrata*; ocular tubercle not tubercularly spinous, but coarsely

granular; the carapacic portion of the dorsal scute with a single tubercle on each side midway between the ocular tubercle and the lateral margin, and two widely separated papilliform tubercles or spines before the sulcus defining its posterior limiting groove. The first segment of the abdominal constituents of the scute marked with a pair of erect, rounded, papilliform spines; spines on the second and third segments erect, subcylindrical, bluntly rounded at the apex, basally tubercular, as long as the spiniform process of the ocular tubercle. Spines on the fourth segment of the scute papilliform, cylindrical, bluntly rounded, alternately larger and smaller, one in the middle quite small, then on each side come a larger, smaller, larger, smaller, and a small marginal. First and second *free terga* similarly armed, but the spines are longer, the longest at least twice as long as wide at the base, the third with a pair of submedian tubercular papillæ and a marginal tubercle.

*Mandibles* spined much as in *A. rostrata*. *Palpi* also as in that species, but of the four spines on the dorsal side of the femur the first and fourth are low and tubercular, and on the lower side of the femur there are two subequal spines distad of the strong basal spine. First *leg* not so strongly tuberculous, its protarsus distally excavated beneath.

♀.—Not differing appreciably from the male in structure, except for the unmodified first protarsus and rather smaller palpi.

*Measurements in millimetres*.—♂. Total length 6; width 4; length of palpus 7.5, of first leg 11, second 21, third 15, fourth 21.

*Loc.* Madagascar: Ambohimombo, a village in the forest of the Tanala district (*C. I. Forsyth Major*).

### *Acumontia Cowani*, Poc.

*Acumontia rostrata*, subsp. *Cowani*, Poc. P. Z. S. 1902, ii. p. 407.

Very nearly allied to *A. echinata*, but distinguishable by the smallness of the spines, the two longest on the scute not exceeding the height of the eye from the carapace and less than the height from the eye to the apex of the ocular spine. Spines on the posterior border of the scute and on the first, second, and third free terga all low, tubercular, and not higher than wide. Of the four spines on the upperside of the femur of the palp, the first is fairly long, a little shorter than the second, but longer than the fourth.

Measurements apparently as in *A. echinata*.

*Loc.* Betsileo (*Rev. Deans Cowan*).



*Acumontia Majori*, Pocock.

*Acumontia Majori*, Pocock, P. Z. S. 1902, ii. p. 407, text-fig. 83, A-A<sup>2</sup> (the specimen questionably described as a female).

Two specimens—a male and a female—were originally described under this name, but the example described as the male is the female, and *vice versâ*. Moreover, the evidence supplied by other species does not justify the opinion that the very considerable structural differences between these two are merely attributable to sex. External sexual characters in the genus *Acumontia* and other genera of Triænonychidæ are usually slight as compared with what obtains in some of the Mecostethous Opiliones. Hence I feel compelled to regard the two specimens in question as representatives of distinct species.

The type of *A. Majori* is the specimen described on p. 409 as questionably a female, and figured on p. 408, figs. A, A<sup>1</sup>, A<sup>2</sup> \*.

*Acumontia Roberti*, sp. n.

*Acumontia Majori*, Poc. P. Z. S. 1902, ii. p. 407 (♂ ?).

To diagnose this species it will be only necessary to contrast it with *A. Majori*.

- a. Scute armed in front near the base of the ocular eminence with a single small spiniform tubercle, the lateral tubercles absent or small; dorsal spines on scute shorter, basal distance between those of the median pair greater than the length of the spine, apical distance between those of the posterior pair not less than the length of the spine; trochanter of palp unspined above; femur with three strong upper spines, five or six inferior spines, and one long internal spine remote from the distal end; distal spine on inner edge of tibia much shorter than the median, the latter close to the distal, remote from the proximal spine; proximal spine on inner surface of tarsus recurved (♂) ..... *Majori*, Poc.
- b. Scute armed in front with two spiniform tubercles, the upper (inner) of which is remote from the ocular eminence; dorsal spines on scute longer, the basal width between the medians less than their height, apical distance between the posteriors only about half their length; trochanter of palp with two spines above, the outer small; femur with five spines above, four in a series, the fifth isolated and more internal; the longish spine on the inner surface of

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\* In this figure the two inferior tubercles near the anterior border of the head-shield are much too large.

the femur close to the distal end; three or four spines on lower side of femur; distal spine on inner side of tibia long, almost as long as the proximal, the median spine only a little nearer to the distal than to the proximal (♀) ..... *Roberti*, sp. n.

*Loc.* Ambohimombo (*C. I. Forsyth Major*).

This species is named after Mons. A. Robert, who accompanied Dr. Major on his expedition to Madagascar and added largely to the value of the collections brought home.

*Synopsis of the Species of Acumontia.*

- a.* Legs short; first a little longer than body, second less than twice as long, fourth about twice as long; ocular spine sharply differentiated by its greater narrowness from the tubercle (♂ ♀) ..... *armata*, Lom.
- b.* Legs long; first about twice as long as body, second and fourth more than three times as long; ocular tubercle and spine forming a long and more or less evenly attenuated process.
  - a*<sup>1</sup>. Protarsus of first leg of male unmodified; first, second, and third free abdominal terga with a few longer and shorter spines (♀ unknown) .... *rostrata*, Poc.
  - b*<sup>1</sup>. Protarsus of first leg in male distally emarginate beneath; four abdominal terga armed with short spines or tubercles.
    - a*<sup>2</sup>. Of the two hindmost pairs of spines on the scute the posterior are much longer and stouter than the anterior and narrowly separated at the base.
    - a*<sup>3</sup>. One spiniform tubercle on anterior portion of scute near ocular tubercle; trochanter of palp unspined above, femur with four large dorsal spines, &c. .... *Majori*, Poc.
    - b*<sup>3</sup>. Two spines on anterior portion of scute on each side remote from the tubercle; trochanter of palp spined above; femur with five dorsal spines, &c. .... *Roberti*, sp. n.
  - b*<sup>2</sup>. Spines of the two hindmost pairs on the scute subequal and widely separated at the base.
    - a*<sup>4</sup>. Tubercles on free abdominal terga subspiniform, much longer than wide; length of spines on dorsal scute much exceeding height of eye from carapace ..... *echinata*, sp. n.
    - b*<sup>4</sup>. Tubercles on free abdominal terga not higher than wide; spines on scute low, about as high as height of eye above carapace ..... *Cowani*, Poc.

Genus *MONOXYOMMA*, nov.

Ocular tubercle not rising from the anterior border of the carapace, but distinctly behind it, moderately high, and armed with a long suberect spine. Scute furnished with a single pair of long spines on what appears to be its third abdominal

segment, the rest of the segments of the scute indicated by a transverse series of granules. Dorsal valve of penis distinctly trilabiate, the protrusible portion (glans) elongate, simple, not tridentate.

Differing from *Acumontia* in the backward position of the ocular tubercle, in the presence of only a single pair of spines on the scute, and in the structure of the penis, the dorsal valve of which in *Acumontia* is bilabiate, the protrusible glans being strongly tridentate. (Pl. XI. figs. 1-1 a, 2-2 a.)

In many respects this genus seems to resemble *Triænonyx*, the type of which (*T. rapax*) is unknown to me; but it at least differs in that the ocular tubercle does not rise from the anterior border of the carapace, and the ocular and dorsal spines are very much longer. Moreover, sketches of the carapace of *T. valdiviensis* which Dr. Hansen has kindly sent to me show that the latter species, although referred by Sørensen to *Triænonyx*, has no distinct spines either on the ocular tubercle or on the scutum.

In the paper above quoted (P. Z. S. 1902, ii. pp. 403-405) I have referred several species of Triænonychidæ to the genus *Triænonyx*. One of them, namely, *T. sublævis*, is certainly congeneric with *Nuncia sperata*, Loman, with which I have been able, through the kindness of Dr. Loman, to compare it. The two differ in the form of the maxillary processes of the second leg and in some other specific features, but must be referred to the same genus. Now the ocular tubercle in *T. sublævis* occupies the same position as the tubercle of *T. valdiviensis*, and differs only in being lower and smooth. In neither does it rise "ex ipso margine scuti," as is said to be the case in *T. rapax* and as is the case in *T. verrucosa*, Poc. I am unable without more material to settle how many genera are here involved, provided all the species hitherto referred to *Triænonyx* and *Nuncia* represent more than one genus.

*Monoxymomma spinatum*, sp. n.  
(Pl. XI. figs. 1-1 c.)

♂.—*Colour* a tolerably uniform reddish brown, lightly clouded with black.

*Dorsal scute* not thickly granular; a series of small tubercles above its anterior border, some more on the sides and above the margin of the thoracic portion; the abdominal portion marked with transverse rows of segmentally-arranged tubercles; a single pair of longish spines rising near the middle of the area between the posterior border of the scute

and the shallow depression defining the thoracic area; anterior margin with the normal 5 porrect spines. *Ocular tubercle* rather low, the eye not much more than its own diameter from its base; the spine longer than the height of the tubercle. The first and second *free terga* with a single row of tubercles, the third with more tubercles subserially arranged.

*Sterna* with transverse rows of weak granules, obsolete in the middle line.

*Mandibles* with basal segment armed distally with 1 or 2 spines, second segment with 2 or 3 strongish spines.

*Palpi*. Trochanter spined below; femur thick, arcuate, and armed above with about 9 spines in two rows, 3 spines on the inner side, 3 beneath externally, and some smaller ones internally, and a large stout bifid or trifid vertically directed spine at its proximal end beneath, also some scattered tubercles; patella unarmed externally, bispinate internally; tibia and tarsus with 3+3 spines, tibia granular below.

Tarsal segments of *legs* 6, 12, 4, 4; protarsus of first modified as in *Acumontia Majori*; coxa of first leg with strong cylindrical spines, coxæ of remaining legs scarcely granular.

*Measurements in millimetres*.—Total length 7; palpus 10; first leg 13, second 21, third 15, fourth 20.

*Loc.* New South Wales: Hill Grove (*R. Broom*).

### Family Phalangodidæ, Simon.

[=*Epedanidæ*, Thorell, Loman.]

### Genus EPEDANUS, Thor.

#### *Epedanus geniculatus*, sp. n. (Pl. XII. fig. 1.)

♀.—*Colour* a rich deep or paler brown, with a large pale green spot on each side of the cephalic area slightly behind the level of the ocular tubercle; legs and palpi dark, the former paler towards the extremities.

*Dorsal scute* polished, a row of marginal tubercles and a row upon each of the four sharply defined divisions. *Ocular tubercle* longitudinally oval, about twice as wide as long, about its own median length from the anterior border of the head-shield; spine smooth, erect, not so long as the width of the tubercle. Abdominal *sterna* smooth, each with a row of short bristles.

Basal segment of *mandible* smooth, second segment with two series of setiferous tubercles in front.

*Palpi* long; trochanter with 1 dorsal and 1 or 2 ventral



spines; femur slender, lightly arcuate, nearly two thirds the length of the trunk, tubercular above and below in its proximal half; patella proximally constricted, smooth, without spines or tubercles, about two thirds the length of the tibia; tibia with its proximal extremity bent upwards at right angles, hence the segment lies at right angles to the patella, armed inferiorly with three pairs of long spines, of which the distal are the shortest, and 1 short spine, varying in position, between the bases of the four proximal spines; tarsus bent at right angles to the tibia, oval, armed below distally with 3 external and 4 internal spines, which decrease in length towards the claw; claw about as long as tarsus.

*Legs* unarmed; coxa of first and second with a few low tubercles below; some marginal tubercles on that of the third; tarsal segments of first leg with 10 or 11, of third and fourth with 8 or 9 tubercles.

♂.—*Mandible* larger, with a few low tubercles on the basal segment, the second elevated at its proximal extremity, its tubercles larger. Tubercles on lower side of femur of palp produced into stout subcylindrical spines.

*Measurements in millimetres*.—Total length 7; greatest width 5.3; length of palp (including trochanter, but excluding claw) 10–11, its femur 4; second leg 17, third leg 16, fourth leg 21, its femur 6.

*Loc.* Hong Kong (*J. C. Bowring*).

This species apparently differs from the Malaysian species referred by Thorell to *Epedanus*, which are unknown to me, in the geniculation of the palpi and the absence of spines from the patellar segment.

#### Genus PLISTOBUNUS, nov.

Resembling *Epedanus* in the position, shape, and armature of the ocular tubercle, the number and depth of the sulci of the dorsal scute, the exposure of the spiracles, &c., but differing in the presence of a pair of long erect spines on the second abdominal segment of the scute, the mandibles very large and long, recalling those of *Rhampsinitus* amongst the Phalangidæ, and the two distal segments of the palpi rotated so as to fold in a horizontal plane with their lower surface looking inwards; also in the presence of spines on the femur of the first leg.

*Plistobunus rapax*, sp. n. (Pl. XII. fig. 2.)

*Colour* a uniform yellowish brown.

*Dorsal scute* smooth, polished; ocular tubercle about the

middle of the carapace, more than its long diameter from the anterior border, its spine erect; anterior border of carapace with a series of small suberect spines, lateral border of scute with a row of tubercles; spines on the second abdominal segment a little shorter than the ocular spine and a little shorter than the basal distance between them; posterior segment of the scute with a series of suberect spines, those on its median third the longest; the first, second, and third free abdominal terga also spined, though less strongly.

Basal segment of *mandible* long, subcylindrical, slightly incrassate, rather longer than the dorsal area of the carapace; segment of the dorsal scute, armed with scattered tubercles or short spines and one very long spine near the middle of its dorsal surface and a shorter one nearer the base; the second segment oval, beset with setiferous bristles.

*Palpi* long, rather slender; coxæ armed above with 2, below with 3 tuberculiform spines; trochanter with 1 above and 3 below; femur slender, arcuate, armed above and below with short blunt spines; patella distally incrassate, elongate, armed with 1 short inferior spine and 3 long distal spines on the inner side; tibia rather shorter than the patella, armed with 5 long inferior (external) spines and 3 superior (internal) spines, also a few short spines on its lower surface; tarsus oval, slightly shorter than the tibia, armed with four pairs of long spines, and its lower surface furnished with a median denticulated crest, upon which the claw closes.

Femur of first *leg* with a series of spiniform tubercles below, that of the second leg similarly but less strongly tubercular, of the fourth leg practically smooth; coxa of first, second, and third legs with a series of granules.

Total length 3 millim.; palpi about 5, fourth leg about 10.

*Loc.* Hong Kong (*J. C. Bowring*).

#### Genus *PODACTIS*, Thorell.

*Podactis pictulus*, sp. n. (Pl. XII. figs. 3, 3 a.)

*Colour.* Trunk yellowish red, ornamented with large deep green patches, exhibiting an alternate or chequered pattern (arrangement), mandibles and palpi a deep rich green; ventral surface of abdomen mesially yellow, laterally green.

Dorsal *scute* coarsely coriaceous, subgranular; from its anterior border on each side arise about 5 tubercular spines, the inner of which is the largest and meets and fuses with the end of a spiniform apophysis, which runs forward from the ocular tubercle in front of the eyes, the two forming a distinct archway. In addition to the paired larger dorsal

tubercles, the last two segments of the scute and the following free terga have a median tubercle equalling the others in size.

*Mandibles* of normal size; basal segment with 1 distal tooth, second segment with 3 proximal teeth.

*Palpi* scarcely longer than dorsal scute; trochanter armed with 1 upper and 2 lower spiniform tubercles; femur with 4 inferior (whereof 3 are proximal) and 1 inner distal; patella with 1 external, 2 internal; tibia with 3 pairs, tarsus with 2 pairs of long spines; patella, tibia, and tarsus of palp subequal in length.

Femur of first *leg* with 5 spines below, the second and third the longest, the fifth the shortest; the rest of the femora unspined, granular; coxæ granular, not spined, except the posterior aspect of that of the second leg, which bears 1 spine.

Abdominal *sterna* with a transverse row of small tubercles.

*Measurements in millimetres*.—Total length about 4·5 (contracted); palp 3·5; first leg 7, second 12, fourth 15.

*Loc.* Ceylon: probably Kandy (*E. E. Green*).

On the evidence supplied by one specimen I do not feel justified in separating this form generically from the Pinang species described by Thorell as *Podactis armatissimus* (Ann. Mus. Genova, (2) x. pp. 99–103, 1890). Specifically the two certainly differ in colour. A further difference is furnished by the larger size of the dorsal tubercles, justifying their description as “*dentes fortes*” in *P. armatissimus*. Nor is the ocular spine in *P. pictulus* describable as “*dentem sat fortem obtusissimum*”; nor has the femur of the first leg spines on its dorsal margin.

## EXPLANATION OF THE PLATES.

### PLATE XI.

*Fig. 1. Monoxyomma spinatum*, gen. et sp. n. Lateral view of dorsal scute and of first three free terga.

*Fig. 1 a.* Ditto. Dorsal aspect of extremity of penis. *gl.*, glans; *v.v.*, ventral valve; *m.d.v.* and *l.d.v.*, median and lateral lobes of dorsal valve.

*Fig. 1 b.* Ditto. Lateral aspect of same, with lettering as in 1 a.

*Fig. 1 c.* Ditto. Claw of fourth leg, showing small lateral branch.

*Fig. 2. Acumontia rostrata*, Poc. Dorsal aspect of extremity of penis with glans partially retracted. Lettering as in *fig. 1 a*, with *d.v.*, left lobe of dorsal valve.

*Fig. 2 a.* Ditto. Lateral aspect of same, with lettering as in *fig. 2*.

*Fig. 3. Sorensenella bicornis*, sp. n., ♂. Anterior end of dorsal scute.

*Fig. 3 a.* Ditto. Claw of fourth leg, showing large lateral branches, for comparison with *fig. 1 c*.

### PLATE XII.

*Fig. 1. Epedanus geniculatus*, sp. n. External side of right palp.

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*Fig. 2. Plistobunus rapax*, gen. et sp. n. Lateral view of scute, anterior three free terga, mandible, and palpus, the latter with tarsus and claw omitted.

*Fig. 3. Podactis pictulus*, sp. n. Lateral view of scute and anterior three free tergal plates.

*Fig. 3 a. Ditto.* Ocular tubercle from the front.

LXI.—*Descriptions of new Genera and Species of New Zealand Coleoptera.* By Capt. T. BROUN, F.E.S.

Group CNEMACANTHIDÆ.

*Mecodema costellum*,  
 ——— intricatum,  
 ——— nitidum,  
 ——— variolosum.  
*Metaglymma rugiceps*,  
 ——— calcaratum.

Group ANCHOMENIDÆ.

*Dichrochile cordicollis*,  
*Anchomenus Walkeri*,  
*Tarastethus simplex*,  
 ——— lævicollis.

Group FERONIIDÆ.

*Trichosternus Walkeri*,  
 ——— akaroensis,  
 ——— bucolicus,  
*Pterostichus Kirkianus*,  
 ——— memes,  
 ——— praignis,  
 ——— setiventris.

Group HARPALIDÆ.

*Allocinopus sculpticollis*.

Group POGONIDÆ.

*Oöpterus latipennis*,  
 ——— probus,  
 ——— parvulus.

Group BEMBIDIIDÆ.

*Bembidium actuarium*.

Group PERICALIDÆ.

*Scopodes viridis*.

Group HYDROPHILIDÆ.

*Rygmodes nigripennis*,

*Cylomissus glabratus*,  
*Zeadolopus spinipes*.

Group OXYTELIDÆ.

*Trogophlæus maritimus*.

Group LUCANIDÆ.

*Lissotes auriculatus*,  
*Mitophyllus comognathus*.

Group PYCNOMERIDÆ.

*Pycnomerus nitiventris*,  
*Bothrideres picipes*.

Group OPATRIDÆ.

*Syrphetodes simplex*.

Group CÆDEMERIDÆ.

*Thelyphassa fuscata*,  
*Techmessa longicollis*,  
*Exocalopus antennalis*.

Group OTIORHYNCHIDÆ.

*Cecyropa lineifera*  
 ——— striata,  
*Brachyolus albescens*,  
 ——— cervicalis,  
*Aphela pictipes*.

Group CYLINDRORHINIDÆ.

*Anagotus pallescens*,  
*Sargon carinatus*.

Group RHYPAROSOMIDÆ.

*Memes rufirostris*.



Group ERIRHINIDÆ.

*Xerostygnus binodulus.*  
*Stephanorhynchus pygmæus.*

Group CERAMBYCIDÆ.

*Drototelus politus.*

Group LAMIIDÆ.

*Hybolasius cognatus.*  
—— *laticollis.*  
—— *gracilipes.*  
—— *genalis.*

Group CRYPTOCEPHALIDÆ.

*Eualema Walkeri.*

Group Cnemacanthidæ.

*Mecodema costellum*, sp. n.

*Robust*; head and thorax shining black, elytra rather dull, legs and antennæ nigro-piceous.

*Head* smooth on the middle, with longitudinal rugæ in front and near the eyes; behind these there are numerous moderately small punctures. *Mandibles* unusually prominent. *Eyes* moderately distant from thorax, rather small, their orbits swollen. *Antennæ* pubescent from the fifth joint onwards, second joint as long as third. *Thorax*  $4\frac{1}{2}$  lines in width by  $3\frac{3}{4}$  in length, widest near the front, rather gradually narrowed backwards, but contracted to  $2\frac{3}{4}$  lines at the base; lateral margins only feebly crenulate; disk with slightly impressed transverse striæ; these, however, become more distinct towards the sides; the dorsal longitudinal groove is well marked, it does not attain the base or apex, but is almost foveiform at the extremities; the basal region bears short longitudinal striæ, and the fossæ are moderately large and close to the sides; just before the middle there is a punctiform impression near each side. *Elytra* oblong-oval, narrower at the shoulders than elsewhere; each with three slightly raised discoidal costæ, the central one somewhat abbreviated, the first and third united near the apex; interstices more or less rugosely but not coarsely punctated, the sides with rather coarser sculpture.

*Underside* almost smooth.

♂. Length 17, breadth  $5\frac{1}{4}$  lines.

Described from a specimen forwarded by Captain F. W. Hutton.

*Hab.* Stephen's Island.

*Mecodema intricatum*, sp. n.

*Elongate*; brilliant black, the antennæ, tibiæ, and tarsi only slightly rufescent.

*Head* longitudinally rugose near the eyes and in front, vertex transversely rugose, the occiput with rugosely punctiform sculpture. *Antennæ* reaching backwards to base of

thorax; basal four joints glabrous, the others pubescent. *Eyes* prominent. *Thorax* of nearly equal length and breadth, apex slightly incurved, base feebly emarginate, lateral margins crenulate and hispid; it is widest near the middle and more or less abruptly constricted towards the base; the basal fossæ and central longitudinal groove are well marked; the transverse linear sculpture of its surface is most obvious near the sides, the basal and apical impressions are longitudinal. *Elytra* elongate, oviform; sutural region nearly plane and feebly strigose, the other portions are without regular striæ or serial punctures and appear as if covered with much interrupted costæ or catenulate sculpture.

*Legs* moderately slender, anterior tibiæ slightly produced.

*Underside* glossy pitchy black; the sides of the head and flanks of prosternum densely rugose; abdomen more finely sculptured, with transverse linear impressions on the terminal segments.

The species may be readily recognized by the very irregular, almost chain-like sculpture of the elytra.

Length 11-13, breadth nearly  $3\frac{1}{2}$  lines.

Te Oneroa, west coast of Otago.

Three examples kindly forwarded by Mr. P. Seymour.

*Mecodema nitidum*, sp. n.

*Elongate*; brilliant pitchy black; the terminal articulations of the antenna, the basal portions of the joints of the posterior tarsi, and the claws rufescent.

*Head* with coarse rugæ, chiefly longitudinal, the sculpture behind the eyes almost punctiform. *Eyes* small but prominent. *Thorax* very nearly as long as broad (2 lines), its sides rounded, abruptly contracted at the base, lateral margins crenulate; the disk bears transverse striæ which are deepest towards the sides; near the deeply impressed dorsal groove these striæ seem irregular, owing to the presence of short oblique or longitudinal striæ; near the front and base the rugæ are longitudinal, the basal foveæ are deep, close to each side, but more distant from the hind margin; this last and the apex are incurved. *Elytra* elongate, oval, their sculpture well marked, consisting of series of punctiform impressions; the two series nearest to each side of the suture are elongated and rather irregular, the third and fourth are deeper, evidently larger and distinctly longer; those nearer the sides are also deep, but many are of quite rounded outline.

*Tarsi* setose, the basal three joints of the anterior prolonged at the outer extremity. The middle *tibiæ* rather more asperate and setose externally than the posterior.

*Underside* shining, the sternum more or less finely punctate.

This species most nearly approaches the *M. rugiceps*, Sharp, but is differentiated therefrom by its smaller size, glossy surface, disparities of sculpture, and emarginated base of thorax.

♂. Length  $7\frac{1}{2}$ , breadth  $2\frac{1}{4}$  lines.

Westport.

Mr. J. J. Walker, F.L.S., of H.M.S. 'Ringarooma,' a well-known European entomologist, who discovered this species, also found a specimen of *M. metallicum*, which he kindly placed at my disposal.

*Mecodema variolosum*, sp. n.

*Body* slightly convex, brilliant fuscous black; legs, antennæ, and palpi rufo-piceous, these last more rufescent.

*Head* rather short, nearly as broad as the thorax, its hinder portion distinctly but not closely punctured; the vertex nearly smooth, near the eyes it is irregularly and coarsely rugose, but on the epistome and labrum the rugæ are longitudinal. *Eyes* but little prominent. *Antennæ* pubescent from the fifth joint onwards, their fourth joint rather shorter than the contiguous ones; they reach backwards as far as the thoracic fossæ. *Thorax* 3 lines long by  $3\frac{1}{2}$  broad, its sides evidently crenulate, only gently rounded, but abruptly contracted behind, this narrowed portion parallel-sided, with rectangular angles; apex widely incurved, the base medially emarginate; the median furrow is entire and rather broad, so that the middle seems slightly depressed lengthways; the basal fossæ are large and placed close to the lateral margins, the disk is rather finely wrinkled transversely, the sides coarsely so; the base and apex are scored with short longitudinal rugæ. *Elytra* oblong-oval, their widest part scarcely exceeds that of the thorax; their lateral sculpture is very coarse and irregular; on each side of the suture there are two series of elongate impressions, which, however, can hardly be termed punctures, but form furrows near the base; the apical sculpture is also irregular and the whole surface is more or less marked by aciculate impressions.

There are eight or nine setæ along each side of the thorax, several on the elytra, four setigerous punctures on the labrum, and four at the extremity of the last ventral segment.

*Underside* black, shining; the head with dense zigzag sculpture; flanks of prosternum closely punctate-rugose; abdomen nearly smooth, but punctate near the base.

Anterior *tarsi* with the four basal joints dilated, the first two somewhat prolonged at the outer angles.

At first sight I thought this might be Redtenbacher's *M. crenaticolle*. The head, however, is not elongate and narrow and the underside is far from being smooth. The head of Castelnau's *M. crenicolle* is simply rugose and the back part seems to be impunctate. A specimen of *M. lineatum* found by me at Tuakau agrees better with Redtenbacher's description, but it has the same close undulating sculpture on the lower surface of the head that is seen in *M. variolosum*.

♂. Length 12, breadth  $3\frac{3}{4}$  lines.

Rotorua.

A single individual, given to me by Mr. J. J. Walker.

*Metaglymma rugiceps*, sp. n.

*Subopaque*, piceous black; antennæ and tarsi pitchy red, palpi paler.

*Head* with coarse longitudinal rugæ near the eyes and finer intervening transverse ones. *Eyes* convex, distant from thorax. *Antennæ* almost nude, there being only a little fine pubescence on the three or four terminal joints. *Thorax*  $1\frac{3}{4}$  lines long,  $2\frac{1}{4}$  broad; the lateral curvature is slight, but near the base the contraction, though considerable, is not very abrupt; the hind angles are obtuse, the base and apex subtruncate; the disk bears numerous transverse striolæ, which become deeper towards the sides; at the base there are short, irregular, longitudinal striæ; the fossæ are large and somewhat oblique, the dorsal furrow does not attain the front, and the lateral margins are a little explanate and feebly crenulate. *Elytra* ovate-oblong, broader behind than they are elsewhere, shoulders rather narrow; they are deeply punctate-striate, the interstices nearest the sides are distinctly narrower than those near the suture, apical sculpture coarsely punctiform or rugose. *Tibiæ* asperate, the outer angles of the anterior strongly produced, the intermediate moderately, the posterior scarcely at all. *Tarsi* setose, the basal two articulations of the front pair considerably prolonged externally, the third less so, yet more distinctly than the fourth.

*Abdomen* smooth at the base, the last segment transversely strigose and bearing two setigerous punctures on each side of the middle at its apex, the intermediate segments with a transverse series of similar punctures on each.

*M. tersatum* is most like this species, but the sculpture of the head and thorax is quite different, and in *M. rugiceps* the joints of the front tarsi are more evidently prolonged.

♂. Length  $7\frac{1}{2}$ , breadth  $2\frac{1}{2}$  lines.

Albury (Mr. J. H. Lewis). One example.



*Metaglymma calcaratum*, sp. n.

*Shining*, rufo-piceous; legs, antennæ, and palpi pitchy red. *Head* smooth. *Eyes* prominent, distant from thorax. *Mandibles* elongate, distinctly punctured above, rugose near the base. *Antennæ* nearly glabrous, having only a little pubescence on the last four joints. *Thorax*  $2\frac{1}{2}$  lines in breadth by  $1\frac{3}{4}$  in length; apex arcuate-emarginate, slightly wider before the middle than it is elsewhere; its sides, however, are apparently gradually narrowed backwards; lateral margins somewhat explanate from the rounded front angles to within a short distance of the base, where they form quite a thin edge; the base is slightly emarginate in the middle, but rounded towards the sides, so that the posterior angles are obsolete; basal fossæ rather large, median groove abbreviated. *Elytra* oval, rather broader than the thorax, shoulders rather narrow, distinctly punctate-striate; posterior sculpture irregular and intermingled with several setigerous punctures, of which there are also three on the seventh interstices.

*Tibiæ* moderately asperate, the anterior somewhat explanate along the outer edge and prolonged at the extremity; the inner calcar is long and extends as far as the apex of the third tarsal joint; intermediate also prolonged outwardly, the posterior less so; the two spurs on each of the hinder pairs are elongate. *Tarsi* setose, their basal articulations but little angulate.

*Underside* piceo-rufous; basal abdominal segment with two pairs of setigerous punctures, the second and third with a transverse series on each, the terminal transversely strigose and with a single puncture on each side of the middle at its apex.

This species should be located next to *M. modicum*, but the shape of the thorax, the general sculpture, the development of the tibial spurs, and antennal pubescence distinguish it.

Length  $7\frac{3}{4}$ , breadth  $2\frac{1}{2}$  lines.

Maniototo, Taieri.

One individual from Mr. J. H. Lewis.

Group *Anchomenidæ*.

*Dichrochile cordicolle*, sp. n.

*Subdepressed*, ovate-oblong, glossy black; tarsi and antennæ rufo-piceous; the basal three joints of these latter, the knees, and tips of palpi rufescent.

*Head* large, minutely and irregularly wrinkled in front. *Labrum* deeply notched. *Eyes* prominent. *Antennæ* elongate,

reaching backwards to intermediate femora; basal three joints glabrous, the others pubescent, first stouter and rather longer than third, second about one third shorter than the following one. *Thorax*  $1\frac{1}{8}$  lines long by nearly  $1\frac{1}{2}$  broad, widest before the middle, gradually narrowed behind, posterior angles obtuse, apex widely incurved, base medially emarginate and obliquely rounded towards each side, lateral margins a little reflexed; the discoidal stria extends from base to apex, the basal fossæ are large; there is a curvate transverse impression in front, with some feeble longitudinal striæ similar to those at the base. *Elytra* oblong, shoulders rounded and slightly narrowed, apices oblique; they have deep impunctate striæ.

There are two setæ on each side of the thorax, one at the hind angle and the other near the middle, and there are four on the hind margin of the last ventral segment of the female.

*Male*.—Anterior *tarsi* with three dilated basal joints, each almost cordate, the first longest. *Mandibles* obtuse at extremity, the right one with a small blunt tooth on the inside, more evident in the other sex.

This is the largest species known to occur here. The thorax is quadrate-cordate. *D. subopaca* and *D. ovicollis* have dull elytra.

Length  $5\frac{3}{4}$ , breadth  $2\frac{1}{8}$  lines.

Te Aroha.

Three examples from Mr. J. J. Walker.

#### *Anchomenus Walkeri*, sp. n.

*Subdepressed*, somewhat nitid, rufescent; legs, palpi, and antennæ testaceous.

*Head* oviform, longer than the thorax and almost as broad as that is; two large sulciform impressions extend from the occiput to the forehead, they are situated nearer to the centre than they are to the eyes; the sides, outside the deep stria which proceeds forwards from each eye, are slightly angulated at the point of antennal insertion; the genæ are broadly rounded. *Labrum* somewhat incurved. *Mandibles* elongate. *Eyes* rather small and but little prominent, distant from thorax. *Antennæ* elongate, slender, their third joint nearly twice the length of the second; they are finely pubescent, the basal two joints, however, are glabrous. *Thorax* as long as broad, widest before the middle, well rounded there, deeply sinuate behind, so that the acute posterior angles appear large and prominent; the base is truncate, the apex emarginate; the median furrow extends from the front and is a little

expanded at the base; the fossæ are large and broad. *Elytra* ample, one-half longer than broad; shoulders rounded, the apex also rounded, so that the extremity of the hind body seems broad; their striæ are well marked, but the punctuation is indistinct; the suture is bent forwards at the apex, so as to form a carina in line with the sixth interstice; the apical sculpture is obsolete; there are three punctures on the third interstices.

*Legs* slender; basal joint of the anterior *tarsi* oblong, fourth small and cordiform, without lobes, and hardly the width of the long terminal one; intermediate joints short; claws simple. The *palpi* are similar in structure to those of *Anchomenus*.

The long, deep, interocular furrows, relatively small thorax, with large outstanding basal angles, and the rather large hind body, broadly rounded posteriorly, give this species a peculiar aspect. The discovery of the male, years hence perhaps, will probably cause its removal from *Anchomenus*; its natural position, however, should be between that genus and *Tarastethus*.

♀. Length  $2\frac{1}{2}$ , breadth 1 line.

Westport.

My unique specimen is another of Mr. J. J. Walker's interesting captures. I have much pleasure in attaching his name to it.

*Tarastethus simplex*, sp. n.

*Body* slightly nitid, piceous; head and thorax more rufescent than the hind body; legs red; palpi, antennæ, and tarsi paler.

*Head* with two erect setæ near each eye. *Antennæ* gradually thickened towards the extremity, the basal three joints glabrous, second joint not much more than half the length of the third, eleventh oval. *Eyes* but little convex. *Thorax* slightly transverse, widely incurved in front, widest near the middle; its sides distinctly margined, moderately rounded, gradually narrowed behind, posterior angles rectangular; the disk is slightly convex, the central groove does not attain the front margin, there are no basal foveæ, and only indistinct sculpture near the hind margin. *Elytra* ovate-oblong, their sides gently curvate; they have fine impunctate striæ and simple interstices; the external, however, form fine carinæ near the apices.

The chief peculiarity consists in the entire absence of the usual thoracic fossæ. The hind body is more oblong and flatter

than in the typical species (*T. puncticollis*, Sharp), so that the lateral margins are conspicuous throughout.

♀. Length  $2\frac{3}{8}$ , breadth 1 line.

Port Chalmers.

A single individual, found by Mr. J. J. Walker.

*Tarastethus lævicollis*, sp. n.

*Nitid*, black, legs and antennæ rufous, antennæ and palpi paler.

*Head* with a deep groove alongside each eye, the frontal impressions feebly punctured. *Eyes* convex. *Thorax* nearly as long as it is broad, base and apex truncate; it is widest before the middle, the sides are only moderately rounded and narrowed behind, the lateral margins are distinct, the posterior angles rectangular; the dorsal furrow does not extend to the base, where there is no apparent sculpture, and the usual fossæ are absent. *Elytra* ovate-oblong, rather wider than thorax at base, humeral angles obtuse, lateral margins somewhat explanate; they are punctate-striate, but the striæ outside the three sutural on each are very lightly impressed or obsolete near the base; the apical carinæ are well developed. *Legs* stout, posterior tibiæ slightly bent.

The elytral sculpture is considerably finer than that of *T. puncticollis*, but more sharply impressed than in *T. simplex*, which, moreover, is a smaller and narrower insect.

♀. Length  $3\frac{1}{4}$ , breadth  $1\frac{1}{4}$  lines.

Te Aroha.

One individual was found quite recently by Mr. J. J. Walker.

*Obs.*—*Zolus femoralis*. This was described about ten years ago from a female found at Wellington. Lately I received a male from Mr. J. V. Hudson for identification, and Mr. J. J. Walker has given me one from Westport and another from Picton, all of which have been subjected to a careful scrutiny, without, however, detecting anything that would justify the separation of any one specimen from my type. The femora are usually clear testaceous, sometimes the legs are wholly pale castaneous. The frontal foveæ on the head in some individuals extend as far as the back of the eyes. The punctuation near the base of the thorax, though feeble in the female, is quite distinct in the other sex. The thorax itself is actually as long as it is broad in some cases, but just perceptibly broader in others. All may be distinguished from Sharp's *Z. Helmsi* by the fine, yet quite distinct, punctures of the elytral striæ.

[To be continued.]



## LXII.—On the Systematic Position and Classification of the Gadoid or Anacanthine Fishes. By C. TATE REGAN, B.A.

IN the order Anacanthini Dr. Günther\* included those fishes which were brought together by the definition "Vertical and ventral fins without spinous rays; ventral fins, if present, jugular or thoracic; air-bladder, if present, without pneumatic duct." Of these the Ammodytidæ are now usually regarded as allied to the Scombresocidæ, whilst the remaining families have been included within the Acanthopterygii by most modern authors. In Messrs. Jordan and Evermann's 'Fishes of North America'† we find that the Lycodidæ, Brotulidæ, Ophidiidæ, &c. are considered to be degraded forms allied to the Blennies, whilst the Gadidæ and Macruridæ are placed next to them, being, however, distinguished by the foramen between scapula and coracoid, and the Pleuronectidæ form a third group, whose nearest relations are stated to be probably with the Gadidæ.

In recent papers Mr. Boulenger‡ has shown that the Pleuronectidæ are nearer to the Cyttidæ than to any other living fishes, and also that the Trachinidæ, Callionymidæ, and Nototheniidæ resemble the Gadidæ and Macruridæ in the position of the scapular foramen, on which account, and taking into consideration the jugular position of the ventrals, he would associate all the Gadoid, Trachinoid, Blenniod, and Batrachoid fishes in one division of the Acanthopterygii,—Jugulares.

The importance of the position of the scapular foramen had, however, been overestimated, for the same author§ has since discovered that *Trematomus* differs from all the other Nototheniidæ in having the foramen entirely within the scapula. I find a similar instance in the Macruridæ, a species hitherto referred to the genus *Bathygadus*—viz., *B. longifilis*, Goode and Bean||—having the scapula perforate. This species also differs from *Bathygadus* in the presence of a slit behind the fourth gill, and I propose to make it the type of a new genus *Gadomus*; it is worth noting that this is undoubtedly a very generalized Macrurid, as is shown by the terminal mouth, cycloid scales, subcontinuous dorsal fins, and the first dorsal

\* Cat. iv. p. 317 (1862), and 'Study of Fishes,' p. 537 (1880).

† Vol. iii. pp. 2453, 2528, and 2602.

‡ Ann. & Mag. Nat. Hist. (7) viii. 1901, p. 261, and x. 1902, p. 295.

§ 'Southern Cross' Fishes, p. 177.

|| *B. multifilis*, Günther, and *B. furvescens*, Alcock, are identical with this species. *B. melanobranchus*, Vaillant, has a slit behind the fourth gill and the foramen between scapula and coracoid; I propose for it the generic name *Melanobranchus*.

ray articulated, and there can be little doubt that the foramen between scapula and coracoid is a specialization which has independently arisen within the Gadoid group, and does not indicate affinity with other fishes in which this specialization has also arisen, concurrently with the forward shifting of the ventral fins.

Since, then, the position of the scapular foramen cannot be used as an absolute character for separating the Gadoids from the Zoarcidæ, Brotulidæ, &c., other distinguishing features must be found if these families are not to be associated in the same group; and after examining all the skeletons available, and in several cases making dissections, it appears to me that the following generalizations hold good:—

In the Gadoids (Gadidæ and Macruridæ) the ventral fins consist of 1–12 soft rays and are below or in front of the pectorals, whilst the pelvic bones are posterior to the clavicular symphysis, to which they are loosely attached by a ligamentous connexion; the first two vertebræ have no epipleurals, the first epipleural being attached to the first rib.

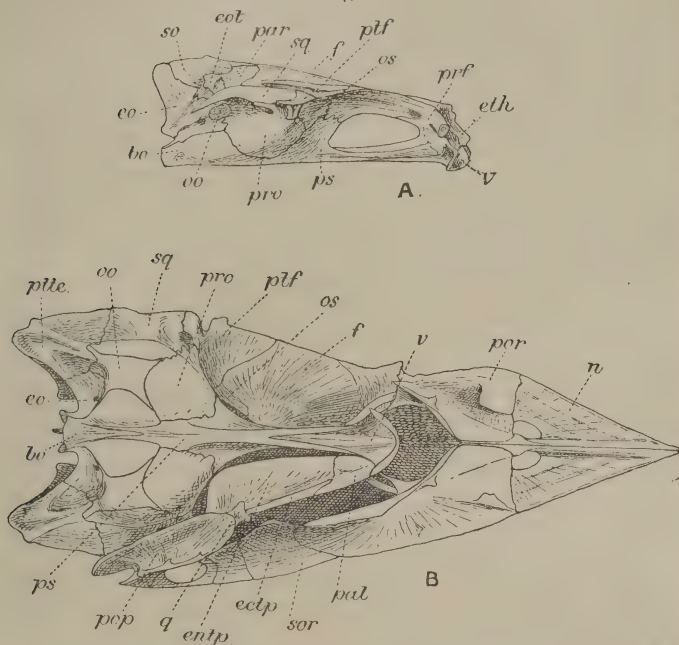
In the Blennioids (Blenniidæ, Zoarcidæ, Brotulidæ, Ophiidiidæ, &c.) the ventrals, when present, consist of less than 5 soft rays, sometimes with the addition of a spinous ray, and are jugular, the pelvic bones being directly and firmly attached to the clavicular symphysis; whilst the first two vertebræ bear sessile epipleurals.

It is evident that the Blennioid fishes are modified Acanthopterygii, but that the Gadoids have originated from some less specialized stock, and that the absence of non-articulated fin-rays, the large number of rays in the ventrals, and the lack of direct attachment of the pelvic bones to the clavicles, taken together, must be regarded as primitive features. From their anatomy and appearance I am inclined to think that the Gadoids are not related to the Percesoces, but are derived from some Haplomous stock from which the Berycidæ have also descended, and of which the Stephanoberycidæ may well be the living representatives. They may be distinguished from the Percesoces by the extreme development of the opisthotic, which forms a large part of the lateral wall of the brain-case and extends down to the basioccipital, thus separating the pro-otic from the exoccipitals. In most Teleostei the exoccipital extends forward below the opisthotic and meets the pro-otic\*.

\* Exceptions are the Fierasferidæ and Gobiidæ, in which the opisthotic has the same relation as in the Gadoids (see Emery, 'Fauna und Flora des Golfes von Neapel,' *Fierasfer* (1880); but in other characters these three groups are widely different.

Most of the Gadoids can be referred to one of two families, viz. Macruridæ, with ventrals below the pectorals and with tapering tail, without separate caudal fin, and Gadidæ, with ventrals anterior to the pectorals and with a distinct caudal fin, which is, however, secondary, symmetrical, and composed mainly of dorsal and anal rays.

Fig. 1.



A. Skull of *Brotula multibarbata*, seen from the side.

B. Skull of *Trachyrhynchus trachyrhynchus*, seen from below.

bo., basioccipital; eo., exoccipital; so., supra-occipital; cot., epiotic; oo., opisthotic; pro., pro-otic; par., parietal; f., frontal; ptf., postfrontal; prf., præfrontal; sq., squamosal; os., alisphenoid; ps., parasphenoid; eth., ethmoid; v., vomer; n., nasal; pal., palatine; por., præorbital; sor., suborbitals; entp., entopterygoid; ectp., ectopterygoid; q., quadrate; pop., præoperculum; pte., post-temporal.

In the Macruridæ I would provisionally include *Melanonus*, a genus known only from one specimen and placed by Dr. Günther\* in the Gadidæ. It differs from most Macrurids in its only moderately elongate body, in having

\* 'Challenger' Deep-sea Fishes, p. 84, pl. xiv.

vomerine and palatine teeth and a single continuous dorsal fin. *Lyconus*, regarded by Dr. Günther\* as the type of a distinct family on account of the undivided dorsal and the presence of pseudobranchiæ, should also be placed in the Macruridæ.

In the Macruridæ we pass from the more generalized forms with cycloid scales, terminal mouth, and continuous or sub-continuous dorsal fins, to those with rough or spinous scales, inferior mouth and projecting snout, and a well-differentiated anterior dorsal. In these latter the snout is formed by the enlarged nasal bones, which unite in the middle line, and are supported below by the united præorbitals; in them also the suborbitals are enlarged and angulated, their upper portion forming an oblique shelf supporting the eye. This feature is most distinct in the genus *Trachyrhynchus*, which represents the extreme of specialization, and in which the posterior suborbitals extend back and join the præoperculum, and there is no trace of a median suture between the frontals. The post-temporal of *Trachyrhynchus* is also peculiar, as in addition to the two forks which are attached to the epiotic and opisthotic there is a third which runs to the exoccipital, and the interspaces between all three are filled in by an osseous membrane, so that it appears to form an integral part of the skull, and has, indeed, been mistaken by Supino† for the opisthotic.

Specialization within this family would seem to have been accompanied by an increase in number of the pectoral pterygials, for whilst *Bathygadus* and *Gadomus* have three and *Macruronus* four, in *Hymenocephalus* there are five, and in *Macrurus*, *Coryphænoides*, and *Trachyrhynchus* six. The extreme interest of the genus *Macruronus*, represented by a single species, *M. novæ-zeelandiæ*, has not yet been appreciated. Although a true Macrurid in the position of the ventrals and the absence of a caudal fin, it is at least as nearly related to the Gadid genus *Merluccius* as to any member of its own family (the evidently closely allied *Steindachneria* excepted). The appearance of the head, with the wide terminal mouth, strongly toothed jaws, &c., is exactly that of a *Merluccius*;

\* 'Challenger' Deep-sea Fishes, p. 158, pl. xlii.

† "Ricerche sul Cranio dei Teleostei, II. *Macrurus*" (Ric. Lab. Anat. Univ. Rom. ix. fasc. 2-3, 1902). In this paper the sutures are not too accurately depicted; as has been said, the post-temporal is mistaken for the opisthotic, and the large opisthotic has not been recognized. The nasal bones are named "mesethmoid," and a pair of inferior frontal ridges "orbitosphenoid." Moreover, I cannot find any trace of a basisphenoid in this species or in any fishes of this suborder.



and this correspondence extends to minute structural details, the upper surface of the skull being precisely similar in both, and unlike that of any other Gadoid, in having a pair of divergent frontal ridges, starting from the supra-occipital crest, and enclosing a large triangular depression. *Macruronus* differs from the Macruridæ and resembles the Gadidæ in the intimate union of the first vertebra to the skull, whilst its neural spine is directly and firmly attached to the supra-occipital crest. Moreover, in both *Macruronus* and *Merluccius* the frontal bones are paired, the pectoral pterygials are four in number, the vomer is toothed, the scales are small and cycloid, concealed glandular pseudobranchiæ are present, and the dorsal fin has an elevated anterior portion composed entirely of articulated rays and subcontinuous with the rest of the fin.

The vertebral column in *Macruronus* is quite normal, the parapophyses being only moderately expanded, and bearing ribs, whereas in *Merluccius* the anterior vertebræ only bear ribs, the other præcaudals having strong and much expanded parapophyses, without ribs.

Messrs. Jordan and Evermann\* make *Bregmaceros* the type of a distinct family, which they place near the Brotulidæ, on account of the supposed similarity in the structure of the pectoral arch. I find that this genus is typically Gadid, the foramen being between scapula and coracoid, the pelvic bones free from the pectoral arch, and the caudal fin symmetrical.

Fig. 2.



Diagrams showing the relations of scapula, coracoid, and pterygials in (A) *Ganomus longifilis* and (B) *Murænolepis marmoratus*.

The genus *Murænolepis*, represented by a single species,

\* Fishes N. Am. iii. p. 2526.

*M. marmoratus*, known only from two specimens from Kerguelen, was placed by Dr. Günther\* in the Gadidæ. It is a highly specialized type, whose nearest relations are with the Gadid genus *Onos*, which it resembles in general appearance, as well as in the composition of the fins, the structure of the skull, and the dentition. The foramen is between scapula and coracoid, but the pterygials are no less than ten in number. The gill-membranes are united, but free from the isthmus, and the gill-openings are restricted from above, commencing below the level of the pectorals. The scales are peculiar, being oblong and arranged at right angles to each other, much as in the Anguillidæ or in some species of *Ophidium*; there is no distinct caudal fin. All these features indicate so considerable a differentiation from the Gadidæ that this genus might well be considered as the type of a distinct family. In his generic diagnosis Dr. Günther states that the air-bladder has a pneumatic duct; the anterior part of the air-bladder is very muscular and the so-called duct is probably a vascular and nervous strand supplying this muscular portion.

The suborder Anacanthini and its component families and subfamilies may be defined as follows :—

#### Suborder ANACANTHINI†.

Parietals separated by the supra-occipital; pro-otic and exoccipital separated by the enlarged opisthotic; pectoral arch attached to the skull; no mesocoracoid; no infra-clavicle. Vertical and ventral fins without spinous rays (except the first dorsal ray of some Macrurids); ventral fins anterior in position, the pelvic bones posterior to the clavicular symphysis and only loosely attached to it by ligament. Gills pectinate. Air-bladder without pneumatic duct.

#### Family 1. Macruridæ.

Suborbitals not forming an internal subocular lamina. Post-temporal forked, attached to the epiotic above and the opisthotic below.

\* 'Challenger' Shore-Fishes, p. 18, pl. viii.

† Certain features of the suspensory apparatus seem to be constant throughout the suborder, and may prove to be of some importance. The head of the hyomandibular articulates within a single socket, to the formation of which the squamosal and postfrontal contribute. The entopterygoid is well developed, attached to the ectopterygoid below and in front by a vertical suture to the palatine. The palatine is attached anteriorly only to the præfrontal, and has a long maxillary process.

*Basis cranii* simple. Vertebrae numerous, the first two without parapophyses, ribs, or epipleurals, those following without parapophyses and with sessile ribs to which epipleurals are attached, most of the præcaudals with well-developed parapophyses, bearing ribs, the epipleurals attached either to the ribs or the parapophyses. Anterior caudal vertebrae with much enlarged hæmal canal. Pectoral pterygials 3-6 in number. Foramen between scapula and coracoid (except in *Gadomus*). Gills four, a slit behind the fourth (except in *Bathygadus*); gill-openings wide, the membranes free from or narrowly joined to the isthmus; 6-8 branchiostegals; pseudobranchiæ, if present, usually glandular, reduced. Mouth protractile, terminal or inferior. Body elongate, tapering, without distinct caudal fin; dorsal and anal fins long, confluent posteriorly, the former with or without a separate anterior portion; ventrals below the pectorals, with 7-12 rays. A mental barbel usually present.

#### Subfamily BATHYGADINÆ.

The first vertebra articulating normally with the skull, its neural spine not directly attached to the occipital crest. First dorsal ray not spinous. First gill-arch entirely free anteriorly.

Genera:—*Melanonus*, *Lyconus*, *Gadomus*, *Bathygadus*, *Melanobranchus*, *Trachyrhynchus*.

#### Subfamily MACRURINÆ.

Differ from the preceding in that the epibranchial and lower part of the ceratobranchial of the first gill-arch are connected by membrane to the wall of the gill-chamber, leaving only a narrow slit in front of the first gill. The first dorsal ray is a non-articulated spine.

Genera:—*Hymenocephalus*, *Malucocephalus*, *Macrurus*, *Coryphænoides*, &c.

#### Subfamily MACRURONINÆ.

Neural arch of first vertebra suturedly united to exoccipitals and its neural spine directly and firmly attached to the supra-occipital crest. In other respects like the Bathygadinæ.

Genera:—*Macruronus*, *Steindachneria*.

#### Family 2. Gadidæ.

Closely allied to the Macruroninæ, from which they differ  
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only in the more anterior ventrals, which have 1-9 rays, and in having a separate caudal fin. Frontal bones united to form an undivided plate (except in *Merluccius*), as in the more specialized Macruridæ. Vertebral column as in the Macruridæ (except in *Merluccius*, in which ribs are absent from the vertebræ with the strong expanded parapophyses). Pectoral pterygials 4-5 in number. Scales small, cycloid. Dorsal and anal fins often divided into two or three portions. A mental barbel usually present.

It has already been pointed out by Mr. Boulenger\* that the Gadidæ must be derived from fishes like the Macruridæ which have lost their caudal fin, as otherwise the structure of the Gadid caudal, which is symmetrical, and supported by the neural and hæmal spines of the posterior vertebræ, and by basal bones similar to those supporting the preceding dorsal and anal rays, is inexplicable. The Macruridæ, although including many very aberrant types, are, in the two essential characters of the more posterior ventrals and absent caudal, less specialized than the Gadidæ, which latter are connected with the more generalized Macrurids through *Macruronus*.

Genera:—*Merluccius*, *Gadus*, *Halargyreus*, *Lotella*, *Phycis*, *Physiculus*, *Haloporphyrus*, *Lota*, *Molva*, *Onos*, *Bregmaceros*, *Brosmius*, *Raniceps*, &c.

### Family 3. Murænolepididæ.

Closely related to the Gadidæ, from which they differ in not having a separate caudal fin, in the gill-openings restricted to below the base of the pectorals, in the increased number (ten) of the pectoral pterygials †, and in the peculiar scales, similar to those of the Anguillidæ. Ventrals with 5 rays. A mental barbel. Frontals forming an undivided plate.

Genus:—*Murænolepis*.

\* Ann. & Mag. Nat. Hist. (7) x. 1902, p. 295 *et seq.*

† The increased number of pectoral pterygials has been regarded by Sagemehl (Morphol. Jahrb. x. 1885, p. 17) as indicating generalization, and has been a great stumbling-block in his discussion of the affinities of *Gymnotus* with the other Ostariophysi, and especially the Characinidæ. The fact, as Mr. Boulenger has pointed out to me, that the same feature is repeated in three such distinct families as the Gymnotidæ, Anguillidæ, and Murænolepididæ, and occurs in genera which are in all other respects more specialized than their neighbours, goes far to prove that Sagemehl was mistaken in his interpretation of this character.



LXIII.—*Lamellicorn Coleoptera from the Nilgiri Hills.*

By D. SHARP, M.A., M.B., F.R.S., &amp;c.

FOURTEEN species of Phytophagous Lamellicorn Coleoptera were recently sent by Mr. C. A. Barber (Government Botanist at Ootacamund, S. India) to the Cambridge Museum to be named. On studying them it appeared that names could not be found for nine of the species, and I here give descriptions of seven of them. Of the other two species only single examples were sent, and they remain to be dealt with when more material shall have been received. A complete set of the new species has been placed in the British Museum (Natural History) and also one in the Museum of the University at Cambridge.

*Holotrichia repetita*, sp. n.

Elongata, testacea, plus minusve picescens, parce punctata; supra nitida, subtus pectore sat dense villosa; capite ecarinato, dense fortiter punctato, clypeo fere rotundato; thorace brevi, parce punctato; elytris fortiter et irregulariter punctatis, subcostatis, utrinque ad basin impressis, impressione oblique strigulosa.

Long. 18–20 mm.

This species has quite the aspect of a somewhat long and narrow *Rhizotrogus*. The clypeus is slightly emarginate in the middle and the whole of the upper surface of the head is coarsely subrugosely punctate. The thorax is very short, the hind angles are definite and obtuse, not at all rounded, the lateral margin is very fine, its front half is very obscurely crenate, there is no expansion, or at most a very slight one, at the front angles; the punctuation is rather distant and coarse, the surface quite shining. Scutellum broad, coarsely punctate. Elytra coarsely and irregularly punctured, elevated along the suture, and each with four other longitudinal elevations—the one next the suture diverges from it in front and disappears before reaching the base; the second is parallel with the first, and between the two at the base there is a depression which is always crossed by two or three fine rugæ; the third elevation is much shorter, and the fourth is a slender one parallel with the outer margin. Pygidium rather small, densely punctate, not convex. Legs long and slender. Labrum deeply divided, its lobes subtruncate. Mentum with only four or five setæ on each side in front. Antennæ 10-jointed, the club about as long as joints 2–7. I am not sure whether all the specimens before me are males or

not; if the female is among them it is extremely like the male externally.

May be placed early in the genus, near *H. parallela*. The collection in the British Museum includes a very old specimen labelled "*montana*, Reiche, Ghauts," which I believe is this species.

Ootacamund (*C. A. Barber*, no. 202 *a*). In the collections of the Cambridge Museum, British Museum, and D. Sharp.

*Holotrichia conferta*, sp. n.

Testacea, plus minusve piceo-obscurata, densissime punctata, opaca, pectore densius villosa; vertice alte carinato, carina emarginata; clypeo brevissimo, dense punctato, medio emarginato; elytris ecostatis.

Long. 16-18 mm.

Mentum in front on each side with a series of long appressed golden hairs covering its surface. Labrum very deeply emarginate. Antennæ 9-jointed, joints 3 and 4 rather short, sharply divided. Clypeus very short and broad, greatly reflexed in front, and broadly but not deeply emarginate. Vertex elevated to form a very strong carina, slightly notched in the middle. Thorax with the hind angles extremely obtuse, the side margin explanate at the front angles, the anterior margin thick, sharply elevated, so as to have a perpendicular face, adapted to the carina of the vertex; the whole surface extremely densely punctate. Scutellum not covered by the hair of the thorax, punctate. Elytra very densely punctate, with a longitudinal impression near the suture, abbreviated in front, and limiting a broad, more coarsely and less densely punctate space. Pygidium broad, rather feebly punctate. Abdominal sutures less effaced than usual. Breast densely clothed with tawny pubescence. Club of antenna short in the female, moderately long in the male.

This may be placed near *H. sinensis*. There is a very old specimen in the British Museum labelled "Madras."

Ootacamund (*C. A. Barber*, no. 202 *b*). In the collections of the Cambridge Museum, British Museum, and D. Sharp.

MELASERICA, Brenske.

*Melaserica*, Brenske, Berlin. ent. Zeitschr. xlii. 1897, p. 421.

This genus has been recently characterized by Herr Brenske and is based on two male specimens found in Tibet at Tatsien-lu. Brenske's description is necessarily very brief, and

there is consequently some doubt whether a large *Serica* found by Mr. Barber in the Nilgiri Hills really belongs to it. It possesses, however, the chief character of *Melaserica*, viz. that in the male the club of the antenna has five leaflets. In the Nilgiri species there are really five leaflets in the male, and, in addition, a considerable prolongation of the fifth joint. In the female of *M. Barberi* there are only four leaflets in the club. The eyes in *M. Brenskei* are remarkably large, and as they are small in *M. tibetana*, and as the specific characters of the two are very different, it must remain doubtful whether the two forms are really congeneric.

*Melaserica? Barberi*, sp. n.

Suboblonga, valde convexa, rufescens, supra (præsertim antèrius) late nigricans; obsolete punctata, elytris leviter striatis.  
Long. 11 mm.

Clypeus red, vertex black, the former shining and coarsely punctate, the latter dull and impunctate, so that the two parts are very different. Eyes large and convex. Thorax short, narrowed in front, the side very little rounded, the hind angles nearly rectangular, only prevented from being so by a short obliquity or change of direction in the base close to them; the surface broadly black, redder about the sides, very dull, almost impunctate. Scutellum elongate, obsoletely punctate. Elytra about the base and suture black, feebly striate, with the interstices slightly convex; dull and almost destitute of punctuation. Pygidium large, black, marked with red along the middle and at the sides. Under surface red, very dull; middle coxæ but little separated; lower face of hind femur dull and impunctate.

The female agrees rather closely with the male except in the structure of the antennæ and in the eyes being a little smaller.

Ootacamund (*C. A. Barber*, no. 210); Nilgiri Hills (*Sir G. F. Hampson*, 94-89, Brit. Mus. Coll.). In the collections of the Cambridge Museum, British Museum, and D. Sharp.

*Serica nilgirensis*, sp. n.

Affinis *S. indicæ*, Bl. Suboblonga, rufescens, supra vix opalescens; elytris crebre irregulariter punctatis, leviter striatis, interstitiis subconvexis.  
Long. 7-7½ mm.

Differs in numerous details from *S. indica*, to which it is closely allied. Male club of antenna very elongate, twice as

long as the scape, in the female not half as long. Clypeus small, very coarsely punctate, similar in the two sexes, very slightly concave in the middle; front plate of mentum strongly transverse, almost oblong. Head and thorax sometimes red, sometimes infusate, sparingly though not finely (on the disk of the thorax obsoletely) punctate; hind angles strongly rounded. Scutellum elongate, very coarsely punctate, with an indefinite smooth space along the middle. Elytra with a coarse subrugulose sculpture, and each with eight longitudinal shallow grooves; on the interstices the sculpture is less concentrated than it is in the grooves, where, indeed, it is concentrated and irregular; the setæ are excessively minute and scanty, though this evidently depends to some extent on attrition. Pygidium obsoletely punctate. Metasternum elongate in the middle, its lateral wings not much more than half as long as the hind coxæ; these are very densely coarsely punctate. Hind femora nearly smooth below, their lower hind margin nearly straight, their upper hind margin very strongly curved, and projecting, near the base, farther back than the lower margin. Tarsi very long and shining.

Ootacamund (*C. A. Barber*, no. 207); apparently abundant. In the collections of the British Museum, Cambridge Museum, and D. Sharp.

The species shows numerous differences from that determined (I believe correctly) in the British Museum as *S. indica*, Blanch.

*Serica pilula*, sp. n.

Rotundato-ovalis, convexa, nigra, opaca, obsolete punctata; elytris obsolete striatis; antennis rufo-sordidis, tarsis piceo-rufis. Long. 5-6 mm.

This is a peculiar species, that becomes very compact and subspherical in form when contracted. This, with the comparatively small eyes and the condition of the specimens, seems to indicate very subterranean habits. Antennæ 10-jointed, the sixth and seventh joints extremely short; the club rather long, longer than the scape. Clypeus small, emarginate in front. Front of mentum smooth and shining, rather large, depressed, its lower margin strongly curved. The sculpture of the whole of the surface peculiarly effaced, the surface dull; the striation of the elytra very fine, indistinct. Middle coxæ widely separated; metasternum short in the middle, almost without channel. Hind coxæ not large, sparingly punctate. Abdomen short; pygidium short.



This species did not exist in the British Museum collection.

Ootacamund (*C. A. Barber*, no. 214); apparently rare. In the collections of the British Museum, Cambridge Museum, and D. Sharp.

*Anomala Olivieri*, sp. n.

*A. variantis*, Ol., affinis, sed superne picea vel nigricans.  
Long. 20–21 mm.

*Melolontha varians*, var. *b*, Olivier, Ent. i. 5, p. 8, pl. x. fig. 123 *b*.

This species has been long known, and was in fact treated by Olivier as a variety of *A. varians* when he first characterized that species. It is apparently distinct, no intermediates having been discovered. The series forwarded by Mr. Barber exhibits a little variation in colour. The sides of the thorax are sometimes extensively pallid, and the dark colour has a variable degree of extension on the pygidium. The legs and under surface of the three thoracic divisions are pallid, the tarsi and ventral segments piceous, and the dark colour extends more or less on to the middle of the metasternum; the terminal ventral plate and the hind margin of the penultimate one are dirty yellow, the broad intervening membrane being more pallid.

The male and female are very much alike, but the male has the hind femora punctate and covered with long pubescence over the whole of the lower face, while in the female there is a smooth space along the middle, limited posteriorly by a series of bristles, behind which the surface is coarsely sculptured and somewhat pubescent. There are also slight differences in the club of the antenna, in the clypeus, in the shape of the claws and the length of the legs, as well as in the shape of the pygidium. In the series before me the female is very much rarer than the male.

In the collections of the Cambridge Museum, the British Museum, and D. Sharp.

Ootacamund (*C. A. Barber*, no. 201).

*Anomala globulosa*, sp. n.

Brevis, convexa, nigricans; antennis, palpis tarsisque testaceis; corpore subtus parce testaceo-hirsuto; elytris punctato-sulcatis.  
Long. 6–7 mm.

This little species is not at all allied to any other and has the appearance of a minute Dynastid rather than of a Rutelid.

It may be compared with *A. ignicollis*, which is as much like it as any other species I know. I have only males before me.

The club of the antenna is remarkably long, being equal to the width separating the eyes. The head is small, the clypeus very much rounded, strongly margined; the surface of the head coarsely irregularly punctured, uneven and rugose. Thorax black and shining, sparingly punctate, the basal margin obsolete except near the angles. Scutellum only very finely punctured. Elytra with deep but irregular striae, which are coarsely and irregularly punctured. Pygidium rather large, elongate and vertical, not convex, coarsely rather sparsely punctate, shining. Legs short; hind femora very broad. Claws unequal, those on the anterior feet quite short, the anterior of the two thick, and with a very short division, which is scarcely separated from the body of the claw; on the other feet the claw is not divided. The abdomen is very short.

Ootacamund (*C. A. Barber*, no. 213); apparently rare. In the collections of the British Museum and the Cambridge Museum.

The elytra are obscure reddish in one of the British Museum examples.

*Adoretus ovalis*, Blanchard.

Fusco-niger, antennis testaceis, pedibus rufo-sordidis; tenuiter breviterque pallide setosus, nullo modo squamosus; elytris obsolete tricostatis.

Long. 12-13 mm.

One of the most obscure species of the genus, destitute of any salient character, and with only a slight difference between the sexes. Mr. G. J. Arrow considers the specimens here described to be *A. ovalis*, Blanch. (*Cat. Coll. Ent.* p. 233), and as there is nothing in Blanchard's brief description to contradict this, and as the locality agrees, this determination may be accepted, though I at first thought that the species was undescribed.

Upper surface somewhat shining, rather finely and indefinitely subrugosely punctate, clothed with scanty, short, pallid, adpressed hairs, none of which are at all like scales. Clypeus rather narrow, eyes only moderately large. Thorax short, in the male a little, in the female strongly narrowed in front; basal margin fine, distinctly sinuate on each side of the middle. Elytra with a scarcely perceptible metallic shimmer and each with three very fine and faint costae.

Under surface sparingly setose, the hairs longer than on the upper surface. The chief distinction between the sexes is that in the female the pygidium is extremely short; in the male it is twice as long.

Ootacamund (*C. A. Barber*, no. 205). In the collections of the British Museum, Cambridge Museum, and D. Sharp.

Cambridge,  
March, 1903.

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LXIV.—*On a new Rat of the Mus rufescens Group from Simla.* By J. LEWIS BONHOTE, M.A.

WHEN revising the Oriental rats of the *Mus rattus* group a short time ago I came across a series of eleven from Simla, differing, so far as I know, from the numerous rats of this group which have already been described. I therefore propose to describe it under the name

*Mus vicereus*, sp. n.

Similar in size to typical *Mus rufescens*, but with shorter tail.

General colour yellowish grey, lighter on the flanks and darker on back, interspersed with long black hairs which, when seen in certain lights, have a greenish gloss. Underparts and feet white, the facial portion and top of the nose very grey. Tail of medium length, not exceeding that of the head and body, markedly bicolor and well clothed with numerous very fine hairs. Ears large and uniform dark brown in colour, having a very narrow line of white hairs round the extreme margin. Fur thickly beset with long and slender spines.

The skull resembles that of *M. rufescens* very closely; it differs, however, in the greater breadth of the nasals, with which is correlated a stouter muzzle. The audital bullæ are rather less inflated on their outer surface, giving them the appearance of lying more obliquely on the skull.

*Dimensions* (of type) from dried skin:—Head and body 173 millim.; tail (tip broken) 130; hind foot 33; ear 23.

*Skull*: greatest length 42 millim.; basal length 34; palatal length 20; length of nasals 15; breadth of nasals anteriorly 4.5; greatest breadth of muzzle 7; zygomatic breadth, approx., 21; greatest breadth of brain-case 16.

*Hab.* Simla.

*Type.* B.M. no. 85. 8. 1. 313. Adult female, 25th October, 1877, collected and presented by Mr. A. O. Hume.

Although closely allied to *Mus rufescens* the short bicolor tail clothed with fine hairs forms an unmistakable character by which it may always be easily recognized. Although the majority of the series are of a very uniform pale colour, several specimens show a tendency to become more rufous, but in no case do they become nearly so bright as in *Mus rufescens*. The narrow white edging to the ear is also a well-marked feature. Externally and at first sight this species bears a considerable resemblance to *Mus Blanfordi*, but the presence of spines in the fur, which are *entirely* absent in *M. Blanfordi*, as well as the pure white terminal portion of the tail of the last-named prevent any risk of confusion. The skulls of the two species are not closely alike.

The average length of tail in the series of eleven specimens is 158 millim. (145-170); the tail of the type is slightly broken at the tip.

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LXV.—*On Two new Species of Cat from China.*

By J. LEWIS BONHOTE, M.A.

THE Museum has just received from Mr. Henry Brelich the skin of a small cat from the province of Kweichow, which is so distinct from the cats hitherto recorded from China that I have no hesitation in describing it as new, and propose for it the name

*Felis Ingrami*, sp. n.

Size very small, and tail less than half the length of the body. General colour pale buff, shading to white on the underparts. Body thickly covered with dark markings of irregular shape, showing especially on the sides a tendency to form rosettes, the centre of the spot being of a warm rufous brown. Along the median dorsal area the markings become linear and form two broken lines the whole length of the body, the ground-colour in this area being similar to that in the centre of the spots. The limbs are spotted in a similar manner to the body right down to the toes. On the underparts the spots are pure black, without any of the rufous hairs. The head above the cheeks is of the same ground-colour as the rest of the body, and from above the eyes four narrow clear-cut black stripes run backwards as far as the shoulders, where they lose themselves in a transverse rufous



collar. There is a short but distinct black stripe starting from the outer angle of the eye and continuing to a little behind the ear; this is bordered below by a pure white stripe, which is in turn succeeded by another black one, the latter ending in a rufous spot. The chin and throat are white with several black collars. The tail is somewhat lighter than the general body-colour, spotted near the base and marked above with six or seven incomplete black rings, which are only slightly narrower than the spaces between them.

*Skull.* There is no skull with the skin.

Dimensions (approximate) from the skin:—Head and body 480 millim.; tail 200; hind foot 75.

*Hab.* Van Gin Shan Mts., N. Kweichow, Central China.

*Type.* B.M. 3. 3. 14. 2. Collected and presented by H. Brelich, Esq.

In its size, proportions, and markings this cat is so distinct that there is no risk of its being confounded with any of the other known species. In the general colour and character of its markings it somewhat resembles *F. scripta*, M.-E., but that is larger and has a longer tail; while in the extreme shortness of the tail it approaches *F. minuta* from Java and Borneo.

I have named this species in honour of Mr. Herbert Ingram, at whose instigation Mr. Brelich collected the present specimen and the fine monkey recently described as *Rhinopithecus Brelichii*, Thos.

The recent acquisition of some fine leopard-skins from China, presented by Mr. F. W. Styan to the British Museum, has caused me to go carefully into the differences between the various forms found in that country, with the result that I find a specimen in the collection from Amur Bay, E. Siberia, so different in form and colour as to require description, and I would propose to call it

*Felis villosa*, sp. n.

Fur long and soft. General colour very pale cream, shading gradually off at the sides and on the limbs to pure white. Many of the black markings, especially along the centre of the back, forming complete circles. On the limbs and quarters the spots are pure black with no light centres. Markings on the tail very much broken up and ending in four black bands, which do not completely encircle the tail. The face, head, and cheeks covered with very small black spots.

I have not been able to examine the skull, which is in the skin.

Dimensions from stuffed specimen :—Head and body 4 feet; tail 2 feet 4 inches.

*Hab.* Amur Bay, E. Siberia.

*Type.* B.M. 95. 10. 19. 1. Presented by the Hon. W. Rothschild.

I should hesitate to describe this species of leopard without access to the skull, were I not convinced that the type (a skull only) of Gray's *Leopardus chinensis* belongs to a species distinct from *Felis Fontanieri* of Mr. Milne-Edwards, and probably to an animal of the present species.

It appears to be a much thicker-set animal, though this may be due to the manner in which it is stuffed, while its longer hair and very pale coloration enable it to be at once distinguished from *F. Fontanieri*.

The skull of Gray's *L. chinensis* is totally different in its general shape and build from that of *F. Fontanieri*. One cannot say whether it belongs to the species I have just described or not, but it is unlikely that there should be three species of leopard in N. China; and if Gray's name of *L. chinensis* was not preoccupied by the same author's *F. chinensis*, I should not have ventured to give a new name to the Amur Bay skin.

The differences between the skulls of *L. chinensis* and *F. Fontanieri* may be best understood by a comparison of the figures, P. Z. S. 1867, p. 264, and Rech. Mamm. pl. xxxi., noting especially the upper line of the cranium, which in *chinensis* runs in a regular and unbroken curve, whilst in *Fontanieri* it tends to reach an apex at the supraorbital ridges, falling off in both directions from that point. The orbit in Gray's *chinensis* is much more inclined to the vertical and does not lie back as it does in *Fontanieri*. The vertical distance from the lowest point of the auditory bullæ to the top of the skull is considerably greater in *Fontanieri*. There are also many other minor differences: the bullæ in the last-named species are more rounded and swollen, and the muzzle is also longer and narrower. The teeth are the same size. The skull of *F. Fontanieri* which I have chiefly used for comparison in the above description is of nearly the same age as Gray's *type*, possibly rather younger, but nevertheless quite adult: some skulls of *Fontanieri*, however, reach a much larger size, equalling those of the Indian leopard; the differences in shape between them and *L. chinensis* are, however, the same as in the particular case described above.

LXVI.—*Report on a small Collection of Echinoderm Larvæ made by Mr. George Murray, F.R.S., during the Cruise of the 'Oceana,' in November 1898.* By E. W. MacBride, M.A., D.Sc., Professor of Zoology in McGill University, Montreal.

ALL the larvæ which I found in the collection were *Bipinnariæ*, and, with the reservations made hereafter, they seem all to belong to the same species, viz. *Bipinnaria asterigera* (Sars), which is the larva of *Luidia Sarsi*.

In the synopsis of all the known species of *Bipinnaria* given by Mortensen ('Die Echinodermenlarven der Plankton-Expedition') two species are distinguished from all the rest by the great elongation of the præoral lobe, or part of the body in front of the mouth, which is bifurcated at the tip into two processes, one belonging to the præoral and one to the postoral band of cilia. These two species are believed to be the larvæ of *Luidia Sarsi* (*Bipinnaria asterigera*) and of *Luidia ciliaris* respectively. The first of the two species is discriminated from the second by the circumstance that the dorsal process of the præoral lobe is longer than the ventral and is heart-shaped, being marked on the border by a median indentation.

All the specimens which are in good enough condition to permit of the determination of these points belong unequivocally to *Bipinnaria asterigera*. Many of them show most distinctly the disk of the future starfish, but in several this is not yet developed. All specimens of *Bipinnaria asterigera* hitherto described have been late larvæ with a well-developed starfish disk; in this collection, for the first time so far as I am aware, the younger stages have been recorded. Where the lateral and posterior processes of the ciliated rings are preserved they are exceedingly long, so as to deserve the name of tentacles; but in many specimens they are mutilated, owing possibly to the shaking up they received on their trans-Atlantic journey.

Garstang, it is true ("Some *Bipinnariæ* from the English Channel," Quart. Journ. Micr. Sc. vol. xxxv.), described a young *Bipinnaria* which Mortensen considers to be probably a young stage of *Bipinnaria asterigera*. This I consider possible, but not probable, for the dorsal process of the præoral lobe is described by Garstang as lanceolate in outline, whereas the youngest specimens of *B. asterigera* in the present collection in which there is not as yet a trace of the

disk of the future starfish have in each case a heart-shaped dorsal process on the præoral lobe.

In the case of two or three of the specimens submitted to my inspection the præoral lobe had been so injured that it was not possible to be certain as to its shape; but, except in one case, the other characteristics left no doubt in my mind that these larvæ were also to be regarded as *B. asterigera*. In the case specially referred to—the only larva recorded in haul 5 (see below)—there was a well-marked five-rayed disk and a very long præoral lobe; but the processes were shorter and the whole larva decidedly smaller than the typical full-grown *Bipinnaria asterigera*. The only other species of *Bipinnaria* so far known which possesses such a long præoral lobe is the larva of *Luidia ciliata*, and this is at once distinguishable by the fact that the starfish disk which it bears is seven-rayed. On the whole I conclude that this somewhat aberrant larva is also to be regarded as *Bipinnaria asterigera*. Dwarf larvæ are not of uncommon occurrence in other species of Echinoderms (I have met them in *Asterina gibbosa* and in *Echinus esculentus*).

Subjoined is a list giving the contents of each haul as submitted to me:—

Haul 1.—Lat.  $52^{\circ} 4'5''$  N., long.  $12^{\circ} 27'$  W. Depth 270 fathoms. Net 2 *b*.

One damaged specimen of *Bipinnaria asterigera* with no trace of the starfish disk.

Haul 2.—Same place and same depth. Net 2 *c*.

Several full-grown specimens of *Bipinnaria asterigera* with a large disk; one with rudimentary disk.

Haul 3.—Same place and same depth. Net 2 *e*.

Two young *Bipinnaria asterigera*; the starfish disk not yet formed.

Haul 4.—Same place. Depth 620 fathoms. Net 2 *f*.

Several *Bipinnaria asterigera* with far-advanced starfish disk; one or two younger stages without disk.

Haul 5.—Lat.  $52^{\circ} 4'5''$  N., long.  $11^{\circ} 20'1''$  W. Surface. Net 1 *a*.

One aberrant larva with five-rayed disk (see above).

Montreal,  
Jan. 16, 1900.



LXVII.—On a new Species of *Sergestes* obtained by Mr. George Murray during the Cruise of the 'Oceana' in 1898 \*.  
By Dr. H. J. HANSEN, of Copenhagen.

*Sergestes inermis*, sp. n.

*Locality.* Lat.  $52^{\circ} 4' 5''$  N., long.  $12^{\circ} 27'$  W. Net no. 2 f. 620 fath. 19/11/98.

A single rather mutilated specimen which measures 24 millim. from the end of the rostrum to the tip of the telson. It seems to be rather far from full-grown, but its eyes are quite black, as in mature specimens of other species.

The rostrum (fig. 1, p. 480) is of medium length, directed forwards and somewhat upwards, its apex produced as a small horizontal spine, at the base of which the upper margin shows a rudimentary projection. Supraocular and hepatic spines are wanting, the gastro-hepatic groove is rather developed. The eyes (figs. 1 and 2) are moderately large, a little shorter than the distal joint of the eye-stalks and somewhat broader than long. The peduncles of the antennulæ have their basal joint somewhat shorter than the two other joints together; the second joint is slightly more than twice as long as deep, seen from above its inner margin is two and a half times longer than its breadth and a little longer than that of the third joint; the third joint is rather thick, seen from the side as deep as the second and slightly more than twice as long as deep, seen from above a little more than two and a half times longer than broad. The antennal squama is distally broad (fig. 2). The pleurobranchiæ (fig. 3) of the second thoracic leg and the first one of the third leg are long; the second branchia of the third leg is well developed, but not quite two thirds as long as the first, and nearly as long as the anterior branchia of the fourth leg, and this is somewhat longer than the posterior branchia. The maxillipeds and the four anterior pairs of thoracic legs have been broken off. The last pair of legs are as long as the peduncles of the antennulæ, narrow; the penultimate joint (fig. 4) about six times longer than broad. The external branch of the uropods is four and a half times longer than broad (fig. 5), its spine situated slightly beyond the proximal two thirds of the margin.

This species is rather closely allied to *S. robustus*, Smith (Bull. Mus. Comp. Zool. x. 1882, p. 97, pl. xvi. figs. 5–8 b),

\* See Journ. Geograph. Soc. vol. xiii. no. 2, Feb. 1899, where the method of capture by a series of open tow-nets is described.

but the last-named form differs from *S. inermis* in the following particulars:—The body is stouter; the rostrum (fig. 6) is longer, directed more upwards, and distally of another shape. The eyes are larger, seen from the side (fig. 6) they are much

Fig. 1. ( $\times 9$ .)



Fig. 2. ( $\times 9$ .)

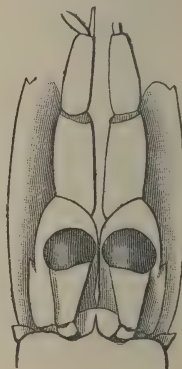


Fig. 3. ( $\times 12$ .)

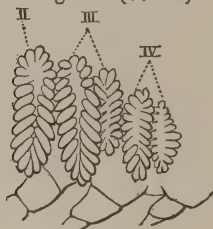


Fig. 4. ( $\times 12$ .)

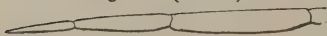


Fig. 6. ( $\times 5$ .)



Fig. 5. ( $\times 6$ .)

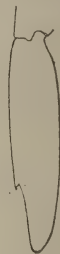


Fig. 7. ( $\times 6$ .)



Figs. 1-5. *Sergestes inermis*, sp. n. Figs. 6 & 7. *Sergestes robustus*, Smith.

longer than the upper margin of the distal joint of their stalks. The joints of the peduncles of the antennulæ are considerably thicker in proportion to their length. The three posterior branchiæ are longer (comp. fig. 6 on pl. xx. in Smith, Report Decap. Crustacea, Rep. U.S. Comm. Fish and Fisheries for 1885). The fifth pair of legs are of the same

length, but considerably broader (fig. 7), with the penultimate joint slightly more than four times longer than broad; the external branch of the uropods only three and a half times longer than broad.

*S. inermis* is not a young specimen of *S. robustus*: in specimens of *Sergestes* which have acquired black eyes the length of the eyes in proportion to the length of their stalks is not altered during growth, and the proportion between length and breadth of the external branch of the uropods remains constant. Furthermore, I have examined specimens of a full-grown *Mastigopus* which I refer to *S. robustus*, and these specimens agree rather well with the adult *S. robustus* and differ from *S. inermis* in some of the features just mentioned—for instance, in the breadth of the fifth pair of thoracic legs and of the external branch of the uropods.

LXVIII.—On some Batrachians and Reptiles from Venezuela.  
By G. A. BOULENGER, F.R.S.

A SMALL collection made by Sr. S. Briceño at Merida, Venezuela, at an altitude of 1600 metres, which it is hoped will be acquired for the British Museum, is interesting as extending the known distribution of several Batrachians and Reptiles and as containing **types** of four undescribed species.

BATRACHIANS.

1. *Hyla crepitans*, Wied.
2. *Leptodactylus caliginosus*, Gir.
3. *Hylodes Briceni*, sp. n.

Tongue oval, entire. Vomerine teeth in two small, rounded or oblique groups behind the level of the choanæ. Snout rounded, as long as the diameter of the orbit; canthus rostralis distinct; loreal region concave; nostril nearer the tip of the snout than the eye; interorbital region as broad as or slightly broader than the upper eyelid; fronto-parietals a little concave, with prominent edges as in *H. Buckleyi*, Blgr.; tympanum distinct, about half the diameter of the eye. Fingers moderate, first shorter than second; toes quite free; disks small, smaller than the tympanum; subarticular tubercles very feebly prominent; a rather large oval inner, and a small round outer metatarsal tubercle. The tibio-tarsal

articulation reaches the tympanum or the eye. Skin smooth above, granular on the belly and under the thighs; a rather broad, feebly prominent glandular fold on each side of the anterior part of the back. Reddish or purplish brown above, spotted or freckled with dark brown; a dark canthal and temporal streak; a dark cross-bar between the eyes; a dark X-shaped marking or chevron-shaped bars may be present on the back; limbs with dark cross-bars; whitish beneath, more or less spotted or closely vermiculate with dark brown.

From snout to vent 43 millim.

Several specimens, females and young.

#### 4. *Phyllobates alboguttatus*, sp. n.

Snout rounded, hardly as long as the eye; canthus rostralis obtuse; loreal region feebly oblique, concave; nostril equally distant from the eye and the end of the snout; interorbital space broader than the upper eyelid; tympanum rather indistinct, about half the diameter of the eye. Fingers rather short, flattened, first not extending as far as second; toes with a rudiment of web at the base; disks of fingers and toes small; a very small, feebly prominent, inner metatarsal tubercle. The tibio-tarsal articulation reaches the posterior border of the eye. Skin smooth. Black above, with small round white spots, disposed in a regular longitudinal series on each side of the back; throat, breast, and anterior part of belly dark brown with round white spots; posterior part of belly and lower surface of limbs white.

From snout to vent 25 millim.

A single specimen.

#### 5. *Thyllobates trinitatis*, Garm.

### REPTILES.

#### 1. *Gonatodes albogularis*, var. *fuscus*, Hallow.

#### 2. *Anolis jacare*, sp. n.

Head twice as long as broad, once and a half as long as the tibia; snout obtusely acuminate, with strong canthus; forehead slightly concave; frontal ridges short and feeble; upper head-scales smooth or slightly rugose, not keeled; scales of the supraorbital semicircles large, separated by one or two series of scales; a few enlarged, feebly keeled supra-ocular scales; occipital as large as or a little larger than the ear-opening, separated from the supraorbitals by one or two series of scales; canthal scales four; loreal rows four or



five; seven or eight upper labials to below the centre of the eye; ear-opening moderately large, oval. Gular appendage large in the male, small in the female; gular scales smooth. Body compressed; a small nuchal fold in the male. Scales small, granular, feebly keeled, a little larger on the back than on the sides; ventral scales rather large, squarish, juxtaposed, smooth. The adpressed hind limb reaches the neck in females, between the ear and the eye in males; digital expansions well developed; 20 to 22 lamellæ under phalanges II. and III. of the fourth toe. Tail feebly compressed, not crested. Male with enlarged postanal scales. Male greyish above, speckled and reticulate with dark green on the head, body, and limbs; a white streak along the upper lip, continued to the ear; tail with dark annuli; lower parts white, gular appendage bright yellow. Female greyish above, without spots, with a broad coppery vertebral band edged with dark grey; limbs with dark cross-bars.

	♂. millim.	♀. millim.
Total length .....	233	218
Head .....	23	20
Width of head .....	11	10
Body .....	50	50
Fore limb .....	30	25
Hind limb .....	50	42
Tail .....	160	148

Several specimens.

3. *Polychrus marmoratus*, L.

4. *Cnemidophorus lemniscatus*, Daud.

5. *Mabuia agilis*, Raddi.

6. *Helminthophis Petersii*, Blgr.

A single specimen, measuring 265 millim., diameter of body 4, length of tail 5. Black; snout white.

7. *Glauconia macrolepis*, Ptrs.

8. *Drymobius Boddaertii*, Sentz.

9. *Atractus erythromelas*, sp. n.

Snout obtuse. Rostral small, nearly as deep as broad, just visible from above; internasals very small; præfrontals as long as broad; frontal as broad as long or a little longer than broad, a little shorter than its distance from the end of the snout, much shorter than the parietals; loreal twice to twice and a half as long as deep; two postoculars; temporals

1+2; seven upper labials, third and fourth entering the eye; three (rarely four) lower labials in contact with the single pair of chin-shields, which are moderately large and separated from the symphysial. Scales in 17 rows. Ventrals 159 to 168 in males, 171 to 186 in females; anal entire; subcaudals 28 to 31 in males, 23 to 25 in females. Coloration very variable. Red above, with black spots disposed quincuncially, or black with red cross-bars continuous across the back or interrupted and alternating; head reddish brown above with black spots; a black streak on each side of the head, passing through the eye; body red beneath, largely and irregularly spotted with black, or with a narrow or broad black median band, or with a median series of small black spots; lower surface of tail uniform red or with a few black spots.

Total length 430 millim.; tail 40.

Several specimens.

Closely related to *A. crassicaudatus*, D. & B. Distinguished principally by the greater number of ventral shields.

#### 10. *Petalognathus nebulata*, Linn.



LXIX.—On Three new Forms of *Peromyscus* obtained by Dr. Hans Gadow, F.R.S., and Mrs. Gadow in Mexico.  
By OLDFIELD THOMAS.

DURING their trip last year to Mexico, Dr. and Mrs. Gadow were good enough to collect a number of mammals for the British Museum, and among these there occur examples of three *Peromysci* which I cannot identify with any known forms and now describe.

It may also be noted that among the other animals they obtained were four examples, from San Mateo del Mar, Tehuantepec, of a hare precisely agreeing with Wagner's *Lepus callotis*, var. *flavicularis*, which had not hitherto had an exact locality recorded for it.

#### *Peromyscus leucurus Gadovii*, sp. n.

\* *Characters.* Size rather large; ears large; tail long and much more hairy than in other Mexican species; almost comparable in this respect with *P. californicus*. Pelage

\* Description arranged as in Dr. Merriam's important paper on the group, Proc. Biol. Soc. Wash. xii. p. 115 (1898).

long, but comparatively harsh; hairs of back about 10 mm. in length. Colour brownish.

*Colour.* Upper parts pale brownish with a slight buffy tinge; sides scarcely more buffy than back. Underparts soiled greyish, about as in true *leucurus*, without fulvous suffusion on chest; chin white; hands and feet white; ankles dusky, the dark colour not passing on to the metatarsals; tail bicolor, white below and for the terminal inch or so all round, blackish above proximally, the two colours passing into each other, not abruptly separated.

*Skull* with a large rounded brain-case and short muzzle; supraorbital edges square, sharp-edged, but without vertically rising bead; palatal foramina almost reaching to the level of  $m^1$ .

Measurements of type:—

Total length 265 millim.; head and body 115; tail 150; hind foot, s. u. 27.6, c. u. 29; ear 25.

*Skull*: greatest length 31.5; basilar length 24; zygomatic breadth 15.4; nasals, length 11.5, interorbital breadth 4.2; breadth of brain-case 14; interparietal  $4.2 \times 11.5$ ; diastema 8.5; palate length 12.5; palatal foramina  $6.6 \times 2.6$ ; length of upper molar series 4.7.

*Hab.* San Carlos Yantepec, Oaxaca, Mexico (between Oaxaca city and Tehuantepec). Altitude 2250 feet. Other specimens from the neighbourhood of Oaxaca city.

*Type.* Female. B.M. no. 3.3.4.55. Collected September 1902 and presented by Dr. Hans Gadow.

This fine *Peromyscus* seems to be a well-marked subspecies of my *P. leucurus*\*, from which it differs by its darker, browner, and less cinereous colour, longer sparser fur, larger ears, and more thickly haired tail. It does not appear to be closely related to any of the forms described by Dr. Merriam.

While the true *P. leucurus* is probably an inhabitant of the low sandy flats near Tehuantepec, *P. l. Gadowii* represents a darker inland form of the same type.

### *Peromyscus Beatae*, sp. n.

*Characters.* Size small medium, about as in *P. aztecus*; ears rather large; tail longer than head and body, well haired, though not so thickly clothed as in the other two species now described.

\* Ann. & Mag. Nat. Hist. (6) xiv. p. 364 (1894). The dorsal hairs of *P. leucurus* are said to be "7 or 8 mm. in length," but only the isolated longer hairs attain this latter length, and were I now describing it I should consider 7 mm. as the full length of the general mass of the fur.

*Colour.* Brownish fulvous, greyer on head and fore-quarters, darker and well-lined with black on back, dull fulvous on sides \*. Under surface dull grey (between greys nos. 8 & 9), not sharply defined laterally; a small buffy pectoral spot occasionally present. Hands and feet dull white, the dusky of the ankles encroaching considerably on the metatarsals. Ears blackish, with a scarcely perceptible whitish edge. Tail blackish above, dull white below, the contrast not strongly marked.

*Skull* of about the size of that of *P. aztecus*, but more lightly built, especially anteriorly; supraorbital edges square, not angular or beaded; interparietal large; palatal foramina variable, particularly long in the type.

Measurements of the type:—

Total length 215 millim.; head and body 97; tail 118; hind foot, s. u. 21, c. u. 22; ear 20.

*Skull*: greatest length 28.2; basilar length 21.6; nasals  $11.5 \times 3.3$ ; interorbital breadth 4.2, interparietal  $3.9 \times 9.4$ ; palate length 11.5; palatal foramina  $6.8 \times 2.3$ ; length of upper molar series (of another specimen, those of the type being worn to the roots) 4.5.

*Hab.* Xometla camp, Mt. Orizaba, 8500 feet.

*Type.* Aged female. B.M. no. 3. 3. 4. 21. Collected 19th July, 1902.

Five specimens from Xometla, besides a rather doubtful young one from the Santa Barbara camp, 12,500 feet.

This pretty species, which I have named in honour of Mrs. Gadow, who assisted in making the collection, is very different to any known to me. Superficially it looks like a larger long-tailed edition of the more common type represented by *P. Cecilii*, but has really no relationship to that animal. Perhaps it is allied to *P. aztecus*, but is entirely without the bright buffy and white contrasts shown by that species. *P. gratus*, Merr., is much paler, with a far whiter belly, and has a quite differently shaped skull.

### *Peromyscus Cecilii*, sp. n.

*Characters.* Small, with medium ears and heavily furred tail. Like *P. melanotis*, Allen, but darker throughout, and especially heavily blackened along the dorsal area.

\* A nearly exact idea of the colour may be gained by American zoologists from the fact that a well-marked specimen of *Peromyscus texanus saturatus*, Bangs, from the type locality, cannot be distinguished in an upper view by colour of body from among the fully developed examples of *P. Beate*, though the fur is, of course, woollier and every other character is different.



*Colour.* Upper parts very dark greyish fulvous, becoming more fulvous posteriorly. Dorsal area heavily lined with black, so as to be nearly black in old specimens, and quite black in young ones, in which it is sharply defined from the lighter lateral colour. Sides dull fulvous brown, rather darker than in allied forms. Underparts dull grey (grey no. 7), darker and less sharply defined than in *melanotis*. Ears black, their white edge more conspicuous than in *melanotis*. Feet dull whitish above, the dusky of the ankles trespassing a little on the metatarsals. Tail heavily haired, black above, white on sides and below.

*Skull* practically as in *melanotis*, but the muzzle and frontal region inappreciably narrower.

Measurements of the type:—

Total length 169 millim.; head and body 94; tail 75; hind foot, s. u. 20, c. u. 21; ear 18.

*Skull*: greatest length 26·5; basilar length 20; nasals 11×3; interorbital breadth 3·9; palate length 10·9; palatal foramina 5·8×2; length of upper molar series 3·7.

*Hab.* Santa Barbara camp, southern slope of Mt. Orizaba, at 12,500 feet.

*Type.* Old male. B.M. no. 3. 3. 4. 23. Collected 21st July, 1902.

Four specimens, two old and two immature.

This animal may be regarded as a saturate mountain ally of the species described as *P. melanotis* from Las Vigas by Allen and Chapman \*, with which it may hereafter prove to intergrade. The darker colour, and especially the heavy blackening of the back, is equally conspicuous in the old and young specimens. The type is quite strongly fulvous on the rump, but this peculiarity is not observable in the other examples.

LXX.—*New Forms of Sciurus, Oxymycterus, Kannabateomys, Proechimys, Dasyprocta, and Caluromys from South America.* By OLDFIELD THOMAS.

*Sciurus igniventris tædifer*, subsp. n.

Coloured in all respects like the typical *S. igniventris* of the Rio Negro, as described by Wagner †, with the exception

\* Bull. Am. Mus. ix. p. 203 (1897). The British Museum possesses an adult paratype of this animal.

† Abh. Ak. Münch. v. p. 276 (1850).

that the hairs of the terminal half of the tail, broadly ringed subterminally with black in *igniventris*, are wholly red beyond their basal  $\frac{1}{4}$  inch, which is dark brown. A very few hairs at the extreme tip of the tail are, however, indistinctly black-ringed. Size rather less than in the typical form, and ears apparently rather shorter.

Dimensions of the type (measured in skin) :—

Head and body 285 millim.; tail 285; hind foot (s. u.) (wet) 59; ear (wet) 31.

Skull: greatest length 65; basilar length 50; zygomatic breadth 36.5; diastema 17.8; palatal foramina 4.5; length of upper tooth series 10.1.

*Hab.* Sabafia Grande, near Bogota.

*Type.* Male. B.M. no. 98.7.3.6. Collected 15th May, 1896, by Mr. G. D. Child, and presented by Oldfield Thomas.

This is the squirrel which, in 1900 \*, I assigned to the true *S. igniventris*, but further study and material induce me to think it represents a definable local form.

*Sciurus castus*, sp. n.

Allied to *S. pyrrhonotus*, Wagn., but with white belly. General colour above grizzled tawny ochraceous, darker and greyer on the head. Ears, cheeks, and upper surface of fore limbs richer tawny. Outer side of hips and upper surface of hind feet deep ferruginous red. Chin tawny, otherwise the whole of the under surface and the inner sides of the limbs pure sharply defined white. Basal two inches of tail like back, the hairs of the remainder blackish brown, broadly washed terminally with bright rufous.

Dimensions of the type (measured in the flesh) :—

Head and body 244 millim.; tail 250; hind foot (s. u.) 60; ear 30.

Skull: greatest length 65; basilar length 48.5; length of upper molar series (true molars only) 8.

*Hab.* of type. Chimate, Bolivia, 68° W., 15° S., on the Upper Rio Beni. Alt 700 m.

*Type.* Female. B.M. no. 1.2.1.7. Original number 1229. Collected 19th September, 1900, by Mr. P. O. Simons.

A second specimen collected by Signor L. Balzan, also in the province of Yungas, is rather redder on the back, but has the same pure white belly.

This fine squirrel is evidently the Beni representative of *S. pyrrhonotus*, Wagn. (type locality, Borba, on the Lower Madeira), from which it differs by its pure white, instead of "weisslichgelb oder ockergelb," under surface.

\* Ann. & Mag. Nat. Hist. (7) vi. p. 137.

*Oxymycterus delator*, sp. n.

A large species of a uniformly blackish colour.

Size fairly large. Fur close and straight; hairs of back about 10 millim. in length, their ends with a slight metallic sheen. General colour of whole upper surface very dark, darker than in any other species of the genus, nearly approximating to Ridgway's "clove-brown," not rufous at all. This is when viewed from behind and above, but if the specimen is held between the light and the observer, with its nose towards him, its upper surface appears blackish with a purplish sheen. Sides scarcely lighter than back. Under surface dull cream-buff with the slaty bases of the hairs showing through. Head like back, a small lighter patch behind and above each eye. Lips and chin dull soiled buffy. Ears small, well-haired, blackish. Arms and legs smoky grey; hands and feet dark brown with some shining lighter hairs on the metapodials. Tail thickly and uniformly haired, black above, rather lighter below.

Skull not specially developed in the muzzle, narrow and elongated, the brain-case being unusually narrow, high, and rounded in section; zygomatic but little expanded. Palatal foramina ending opposite the first third of  $m^1$ ; posterior nares slightly behind the back of  $m^3$ .

Dimensions of the type (measured in the flesh):—

Head and body 155 millim.; tail 106; hind foot, s. u. 26, c. u. 28.5; ear 17.

Skull: greatest length 34.5; basilar length 28; zygomatic breadth 14; nasals  $12.1 \times 3.5$ ; interorbital breadth 5.1; brain-case breadth 13.4; palate length 13.4; diastema 8.5; palatal foramina  $7.1 \times 2.9$ ; length of upper molar series 5.

*Hab.* Sapucay, Paraguay.

*Type.* Adult male. Original number 880. Collected 24th October, 1902, by Mr. William Foster.

This very remarkable *Oxymycterus* is readily distinguishable from all its allies by its uniformly dark colour, in which respect it is only approached by the otherwise widely different *O. juliacæ*, Allen.

*Kannabateomys amblyonyx pallidior*, subsp. n.

General characters as in *K. amblyonyx*, but colour paler throughout, the belly being almost white.

Size as in *K. amblyonyx*. General body-colour dull buffy yellowish, not dissimilar to that of young examples of the type form, but very different from the strong ochraceous of adults. Head grizzled grey and black, without yellowish suffusion; ear-tufts grey; light patches behind ears yellowish

white; sides of muzzle brown; lips, chin, chest, and inner sides of limbs white. Belly whiter than "cream-buff," that of *amblyonyx* being "buff" or "ochraceous buff." Hands and feet coarsely grizzled grey, the digits white. Tail dull brown, lightening to white terminally, its under surface white all along. In the type there is an intermediate piece of the tail abruptly white all round, but this is probably an accidental variation; the extreme tip of the tail appears to be lost, so that I cannot say what is the colour of the terminal pencil.

Skull apparently quite as in true *amblyonyx*.

Dimensions of the type (measured in the flesh):—

Head and body 250 millim.; tail 315; hind foot, s. u. 51, c. u. 52; ear 23.

Skull: greatest length 64, basilar length (c.) 49; length of upper molar series 15.

*Hab.* Sapucay, Paraguay.

*Type.* Old female. Original number 886. Collected 14th November, 1902, by Mr. William Foster.

"Caught in monte.—Pregnant: one at birth."—*W. F.*

Though strikingly different in colour, especially in that of the underside, from the true *K. amblyonyx* of São Paulo, this fine animal is too essentially similar in other respects to be regarded as more than a subspecies. Its discovery, like that of *Thrichomys Fosteri*, adds a new genus to the known fauna of Paraguay.

*Proechimys vacillator*, sp. n.

Allied to *P. Cherriei*, Thos., but larger, with shorter tail, shorter palatal foramina, and other cranial differences.

Fur of medium length; spines of back about 18 millim. long. Rump entirely spineless.

General colour above tawny or tawny ochraceous, more or less heavily lined with the blackish tips of the spines. Sides more brownish. Whole of under surface pure sharply defined white. Face dull greyish brown. Outer side of limbs like sides, inner white; hands white; feet white along their inner halves (outer in the prepared skin), pale brownish along their outer, hallucal, halves. Tail well haired, dark brown above, dull white below.

Skull nearly as large as that of *P. cayennensis*; muzzle not so elongated as in that species and the *trinitatis* group. Nasals with their sides more or less bowed outwards, their posterior end narrowing nearly to a point, level with the hinder edge of the pre-orbital bridge. Supraorbital ridges well developed and forming a distinct postorbital angle, but fading away



halfway across the parietals. Palatal foramina short, widely open, extending backward but little more than midway between the premaxillo-maxillary suture and the front of  $p^4$ ; not leading posteriorly into gutters along the palate. Opening of posterior nares narrow, sharply V-shaped, its anterior point in front of the hinder edge of  $m^2$ . Bullæ small, though longer than in *Cherriei*, the vacuities in front of them widely open.

Molars very small, rounded, one or more of them with three laminae only, but this character, at first sight so important, varies within the series.

Dimensions of the type (measured in the flesh):—

Head and body 230 millim.; tail (lost, of another specimen 165); hind foot, s. u. 46, c. u. 51; ear 23.

Skull: greatest length 56.5; basilar length 40; zygomatic breadth 26.5; nasals  $21.5 \times 6.7$ ; interorbital breadth 12.2; palate length 18; palatal foramina  $5.8 \times 3.2$ ; length of upper tooth series 7.5.

*Hab.* Kanuku Mountains, British Guiana. Altitude 600 feet.

*Type.* Adult male. B.M. no. 1.6.4.112. Collected 6th December, 1900, by Mr. J. J. Quelch, and presented by Mr. F. V. McConnell.

This is the species assigned provisionally to *P. cayennensis* in my paper on the mammals from the Kanuku Mountains obtained by Mr. Quelch\*. The Museum has now received a set of spiny rats from Cayenne, topotypical of *P. cayennensis*, Desm., collected by Messrs Cherrie and Gault, and these show Desmarest's species to be nearly allied to *P. trinitatis*, with long parallel-sided nasals and large teeth, certainly distinct from the Kanuku animal.

The variation in the number of the laminae to the posterior molars is very remarkable and will need further specimens for its elucidation. One specimen has all three molars trilaminar, the premolar alone being quadrilaminar, another (the type) has the two posterior molars trilaminar, while a third has the last molar alone of this structure. A fourth specimen, indeed, has all the teeth quadrilaminar, as is usual in the allied species, but this example shows certain other differences which make its identity with *P. vacillator* a little doubtful.

#### *Dasyprocta lucifer*, sp. n.

A yellow-rumped species allied to *D. rubrata*, but larger.

Size considerably greater than in *D. rubrata*. General

\* Ann. & Mag. Nat. Hist. (7) viii. p. 152 (1901).

coloration as in the Cumaná subspecies *flavescens*—that is to say, dark punctulated olive-brown, the limbs darkened terminally to black, and the long hairs of the rump rich orange (near “orange-buff”). Chin dull whitish; chest and belly brown, the latter with a median line of dull yellowish.

Skull large, long and narrow, especially elongated in the muzzle. Nasals narrow, evenly rounded into a uniform semi-circular curve behind, surpassing by 6–7 mm. the premaxillary processes, which are of fair normal breadth. Teeth stout and strong, conspicuously larger than in *D. rubrata*.

Dimensions of the type (measured in the flesh):—

Head and body 502 millim.; tail 41; hind foot, s. u. 115, c. u. 128; ear 47.

Skull: greatest length 114; basilar length (c.) 86; zygomatic breadth 49; nasals  $44.5 \times 18$ ; interorbital breadth 31.5; palate length 45; diastema 30; length of upper tooth series ( $p^4$  up and in wear) 20.2.

*Hab.* Caicara, River Orinoco.

*Type.* Old female. B. M. no. 98. 12. 1. 21. Original number 11250. Collected 22nd October, 1898, by Mr. G. K. Cherrie.

Native name “Picuré” or “Acuré.”—*G. K. C.*

Exactly as in the case of the Philander Opossums, a form of the small species inhabiting Trinidad (*D. rubrata*) occurs in Cumaná (subsp. *flavescens*), while the animal found further east on the Orinoco and in Cayenne is conspicuously larger than either. But in the present case the Cayenne form shows certain differences from the Orinoco one, and may itself be subspecifically separated as

*Dasyprocta lucifer cayennæ*, subsp. n.

General colour as in *lucifer*, but the nape and fore back nearly uniform brown, scarcely punctulated at all.

Skull readily distinguishable from that of *lucifer*, with which (allowing for age) it agrees in size, by the very different shape of the nasals, which are broad, nearly squarely truncated behind, and scarcely surpassing the premaxillary processes; these latter run to a fine point and are unusually narrow, being only 2.2 millim. broad 8 millim. from their tips.

Dimensions of the type (measured in the flesh):—

Head and body 500 millim.; tail 35; hind foot, s. u. 119, c. u. 136; ear 42.

Skull: greatest length 104·5; basilar length 78; nasals  $35 \times 18\cdot5$ ; interorbital breadth 31; palate length 42; diastema 27; length of upper molar series (milk  $p^4$  still in place) 22.

*Hab.* Approuague, Cayenne.

*Type.* Immature female. Original number 1077. Collected 9th December, 1902, by G. K. Cherrie and B. T. Gault.

With most animals the skull-differences above noticed would have necessitated specific separation, without further question, but this part is so variable in *Dasyprocta* that for the present I prefer to leave the Cayenne Agouti with the form to which its general appearance allies it.

*Caluromys trinitatis venezuelæ*, subsp. n.

Agreeing with true *trinitatis* in essential characters of size and coloration, but paler and with longer softer fur.

General characters quite as in the Trinidad *C. trinitatis*, Thos.\* Fur, however, much longer, softer, and woollier, the lengths of the dorsal hairs about 12–13 millim., as compared with 8–9 millim. Colour above, instead of "tawny ochraceous," paler and duller, near Ridgway's "clay-colour"; the crown of the head alone showing a tinge of tawny. Cheeks and under surface, instead of ochraceous buff, dull "cream-buff." This latter colour is also more uniformly spread, the whole of the under surface and inner sides of the limbs being alike, while in *trinitatis* the greyish suffusion of the flanks encroaches on the sides of the middle part of the belly, so as to narrow the clear buffy part to a mere median line.

Skull and teeth as in *C. trinitatis*.

Dimensions of the type (measured in the flesh):—

Head and body 185 millim.; tail 275; hind foot (s. u.) 31; ear 31.

Skull: greatest length 47; combined length of three anterior molariform teeth 6·7.

*Hab.* Ypuré, Cumaná, Venezuela. Altitude 2350 feet.

*Type.* Old female. B.M. no. 0.5.1.57. Collected 8th March, 1899, by E. André.

This mainland form of *C. trinitatis* shows no approximation in size or other characters to the Guianan *C. philander*, L.

\* Ann. & Mag. Nat. Hist. (6) xiii. p. 438 (1894).

LXXI.—*Two new Dormice of the Genus Eliomys.*

By OLDFIELD THOMAS.

IN working out a Saharan Lerot recently received by the Tring Museum I find the two following new forms in the British Museum collection to need description:—

*Eliomys gymnesicus*, sp. n.

A small short-eared form, coloured like the European *E. quercinus*.

Size rather less than in the true *E. quercinus*, consequently very much less than in the large *E. Amori* of Spain, which, on the analogy of other members of the fauna, should have been the closest ally of the Balearic Lerot. General colour closely similar to that of ordinary German examples of *quercinus*, the bright rufous of the back similarly becoming greyish on the sides, the grey getting slightly darker where it edges the light colour of the belly. Cheeks, shoulder-patch, arms, inner sides of legs, and whole of under surface dull creamy. Facial markings arranged as in *quercinus*, but less extended, the orbital ring narrower and the black at the roots of the whiskers cut off from the rest by a narrow light-coloured space. Ears decidedly shorter than in *quercinus*. Tail unusually slender, its coloration as in *quercinus*, but the subterminal black is very narrow and surpassed on each side by the fringing edge of the white, which is conspicuously developed.

Skull short and broad, the zygomata boldly expanded. Brain-case narrower than in *quercinus*. Palatal foramina widely open. Bullæ short, highly inflated, more spherical than in *quercinus*. Teeth markedly larger, and especially broader, than in *quercinus*. In these respects the skull is more like that of *E. sardus*.

Dimensions of the type (measured in the flesh by myself):—

Head and body 131 millim. (110–131)\*; tail 107 (100–107); hind foot (s. u.) 26 (25·5–27); ear 21 (20–22).

Skull: greatest length 33·5; basilar length 26·1; zygomatic breadth 19·6; nasals, length 11·8; interorbital breadth 4·1; palate length 12·1; diastema 7·2; palatal foramina 4·7 × 2·4; length of upper tooth-row 5·6; breadth of  $m^2$  1·9.

*Hab.* San Cristobal, Minorca, Balearic Islands. Alt. 100 m.

\* Measurements in brackets show the extremes in a series of five.



*Type.* Old male. B.M. no. 0. 7. 1. 47. Original number 277. Collected and presented by R. I. Pocock and Oldfield Thomas.

Deceived by its close similarity in coloration to *E. quercinus*, I have hitherto assigned the Balearic "*Rata sarda*" to that species; but closer study of the group shows not only that it is distinct, but inclines me to think that it is allied rather to the southern forms of the group—*Amori*, *sardus*, *pallidus*, and *cincticauda*,—all of which differ from it by having a black ring round the tail.

*Eliomys lerotinus tunetæ*, subsp. n.

A small *Eliomys* with the tail almost wholly black (except the extreme tip); ears of normal size.

Size about as in the typical form. General colour above dull fulvous, about as in *E. quercinus*. Cheeks and under surface uniform cream-colour, almost "cream-buff," not sharply defined laterally. Facial markings about as in the type, the lines on the whole narrower than in *E. quercinus*. Ears of normal size, not enlarged as in *melanurus*. Hands and feet creamy white. Tail rather short, bushy terminally, not distinctly distichous, its basal fourth above grey, heavily grizzled with black, the remainder deep black above and below, except that the hairs of the extreme tip are white or ringed with white. In the typical *E. lerotinus* there is much more white on the tail, whose basal third below is dull whitish, middle third black largely mixed with white, and terminal third pure white.

Skull and teeth as usual in this group; the palatal foramina rather longer and the bullæ larger than in true *lerotinus*.

Approximate dimensions of the type (measured in skin):—

Head and body 120 millim.; tail 83; hind foot (s. u.) 24.

Skull: tip of nasals to back of parietal suture 31; length of upper molar series 5.

*Hab.* (of type). Karouana, Tunis. Two specimens in the Lataste Collection from Bône, N.E. Algeria, near the Tunisian frontier.

*Type.* Adult female. B.M. no. 46. 11. 4. 1. Collected by Louis Fraser.

This dormouse had been long supposed to be Wagner's *E. melanurus*, but the recent acquisition of two specimens of that most distinct species from Sinai has enabled me to correct the mistake.

Lataste's "*Bifa lerotina*" is unquestionably an *Eliomys* which has lost its posterior molars. The genus will therefore

fall, but the specific name may be used for the Mزاب *Eliomys*, of which for the present the Tunisian and Eastern Algerian form may be looked upon as a subspecies. It may, however, prove to grade into the still earlier described *E. munbyanus*, Pomel, of Morocco and Western Algeria (typical locality Oran), of which both *lerotinus* and *tunetæ* in that case would have to rank as subspecies.

LXXII.—On the Species of the Genus *Rhinopoma*.

By OLDFIELD THOMAS.

THE Egyptian Pyramids are inhabited by large numbers of bats of the genus *Rhinopoma*, the mouse-tailed bat, first recorded by Belon as long ago as 1554. By Dobson, in his Catalogue, the members of this genus, whether from Egypt or India, were all combined under one heading, *R. microphyllum*, "Geoffroy," although both Peters and Heuglin had pointed out that in Egypt two forms were present, a larger and a smaller, the former having the tail shorter than the forearm, the latter longer\*.

But in giving new names the two German authors, misled by their belief that Geoffroy's measurements were the original ones, affixed the names to the larger form. Now, however, that Anderson and de Winton's work† has drawn attention to the fact that it was Brünnich, and not Geoffroy, who first described the species, I am able to state, on measurements kindly furnished me by Dr. Winge, that the type, still preserved in the Copenhagen Museum, is the large form with short tail (forearm 67·5 millim., tail 61). The smaller one, as to whose distinction from the larger no one who had compared the skulls could doubt for one moment, will therefore require a new name, and may be called

*Rhinopoma cystops*, sp. n.

Size comparatively small (forearm averaging about 52 millim., and rarely attaining 55). Nose-leaf more developed than in *R. microphyllum*. Ears proportionally large, the frontal band joining them particularly high. Tail very long and slender, longer than the forearm.

\* *Rhinopoma lepsianum*, Peters, MB. Ak. Berl. 1859, p. 222 (Blue Nile).

*Rhinopoma cordofanicum*, Heugl. Reise N.O.-Afr. ii. p. 24 (1877).

Fitzinger also applied two names—*R. senaarensis* and *longicaudatum*—to members of this genus, but gave no descriptions.

† Mamm. Egypt, pp. 143 & 147 (1902).

Skull small, narrow and delicate (greatest length 16-17 millim., as compared with 19-20 in *R. microphyllum*); muzzle with two inflated projections, one on each side of and above the nasal opening, with a longitudinal groove between them. In *R. microphyllum* this region is almost flat, and its angles, although thickened, are not conspicuously inflated. Sagittal crest but little developed, not connected anteriorly with the nasal projections.

Dimensions of the type (an adult female, measured in spirit before skinning):—

Forearm 53 millim.

Head and body 53; tail 59; hind foot (s. u.) 11.5; ear 17.

Skull: greatest length 16.7; basal length 14; occipito-nasal length 14.5; zygomatic breadth 10; breadth of brain-case 7.2; front of canine to back of  $m^3$  5.6.

*Hab.* (of type). Luxor, Lower Egypt. Other specimens from many Egyptian localities, southwards to Gebel Auli, Soudan (*H. F. Witherby*). Examples from Palestine (*Tristram*), Midian (*Burton*), and Aden (*Percival & Dodson*) are also assignable to *R. cystops*.

*Type.* Adult female. B.M. no. 2. 1. 17. 2. Collected and presented by the Hon. N. Charles Rothschild.

Not only, however, are these two Egyptian species distinct from each other, but the members of the genus elsewhere appear to fall into two groups corresponding to them both in external proportions and in the characters of the skull.

To the first or *microphyllum* group, besides the type species, whose range extends from Egypt and Palestine (*Tristram*) to Persia (*Witherby*), there belongs the large form described below as *R. sumatræ*.

To the second, besides *cystops* itself, the species recognizable are *Hardwickei* from India and *muscatellum* from Muscat.

Apart from the differences in size and length of tail that separate the two groups, the species are very like each other externally; but the skull-characters are in all cases most obvious, and leave no room for doubt as to the distinctness of the various forms.

*Rhinopoma sumatræ*, sp. n.

A large species allied to *R. microphyllum*.

Size very large, the largest of the genus. General colour dull brown, little lighter below. Nose-leaf and ears short, the connecting band between the latter comparatively low. Tail shorter than forearm.

Skull large and heavy, considerably larger than those of  
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*R. microphyllum* and *Hardwickei*. Sides of top of muzzle thickened and rounded, but not inflated. Sagittal crest very high in the frontal region.

Dimensions of the type (measured in spirit) :—

Forearm 72 millim. (in another specimen 70).

Head and body 73; tail 65; ear 20; connecting band, height behind in centre 3; third finger, metacarpus 52, 1st phalanx 10, 2nd phalanx 19; fifth finger, metacarpus 47, 1st phalanx 10, 2nd phalanx 10; lower leg and hind foot (s. u.) 40.5.

Skull: greatest length 21.2; basal length 18.2; occipito-nasal length 18.6; zygomatic breadth 12.8; breadth of brain-case 9.2; front of canine to back of  $m^3$  8.

*Hab.* Balighe, Lake Toba, N.W. Sumatra.

*Type.* Old male. B.M. no. 0.8.2.17. Collected by Dr. E. Modigliani, and presented by the Museo Civico, Genoa.

This is the largest species of the genus, and differs from the Indian *R. Hardwickei* not only in size but in the non-inflation of its nasal prominences.

### *Rhinopoma muscatellum*, sp. n.

Allied to *R. cystops*, but rather smaller, with larger bullæ and smaller teeth.

Size rather less than in *R. cystops*, therefore the smallest member of the genus. Ears large, thin, with a high connecting band. External characters generally as in *cystops*.

Skull small, slender, and delicate, almost or quite without sagittal crest. Its anterior portion narrower than in *cystops* and more parallel-sided, so that the outline as seen from above runs backwards and then abruptly turns outwards at the zygomata; in *cystops* and other species the general outline diverges evenly to the broadest point of the zygomata. Nasal prominences large, thin, inflated, projecting forward decidedly in front of the anterior end of the middle line of the nasals. Supraorbital edges scarcely ridged. Brain-case small, low, its walls unusually thin and translucent. Hinder edge of the palate distinctly behind the level of the last molar. Bullæ conspicuously larger than in the allied forms. Teeth very small, both above and below, the lower molars noticeably less high-crowned than usual; lower incisors thin and barely touching one another instead of being pressed closely together; anterior lower premolar barely half the height of the posterior.



Dimensions of the type (measured on a spirit-specimen):—  
Forearm 49 millim.

Head and body 53; tail 60; ear 17.5; third finger, metacarpal 33, first phalanx 7.2, second phalanx 14.7; fifth finger, metacarpal 30, first phalanx 8, second phalanx 7.2; lower leg and hind foot (s. u.) 32.

Skull: greatest length 16; basal length 14; occipito-nasal length 14.2; zygomatic breadth 9.5; breadth of brain-case 6.7; front of canine to back of  $m^3$  5.3.

*Hab.* Muscat. *Type* from Wadi Bani Ruha.

*Type.* Old male. B.M. no. 94.3.9.17. Collected and presented by Dr. A. S. G. Jayakar. Eight specimens examined.

This species is readily distinguishable from all others by its delicately built, nearly unridged skull, its small teeth, and large bullæ.

### LXXIII.—*New Species of Eastern and African Lepidoptera.*

By Colonel C. SWINHOE, M.A., F.L.S., &c.

#### Family Nymphalidæ.

#### Subfamily Euplœinæ.

#### *Crastia circuita*, nov.

♂. Rufescent brown, the borders paler; a small round subcostal spot beyond the middle on the fore wings, one a little above the origin of vein 3, another evanescent in the interspace below; the marginal and submarginal white spots above and below as in *E. Distanti*, Moore, from Sumatra, but the spots are rounder and more uniform in size, the sub-apical spots of fore wings less than one third the size.

Expanse of wings  $3\frac{7}{16}$  inches.

Tonkin (*Fruhstorfer*).

#### *Crastia tonkinensis*, nov.

♂ ♀. Paler than the above and more rufescent, the apical border nearly as pale as some specimens of *C. Godarti*, Lucas; spots disposed of as in the above, but much smaller; no spot in the first interspace of fore wings, the next three mere dots; the last spot of the submarginal series next to the subcostal dot altogether absent, and the spots on the hind wings evanescent.

Expanse of wings  $3\frac{3}{16}$  inches.

Tonkin (*Fruhstorfer*).

This species is nearest to *C. Binghami*, Moore, from Burma.

Subfamily *Nymphaliniæ*.*Symbrenthia florida*, nov.

♂. Belongs to the *hippoclus* group, the fulvous markings of the wings above much darker: the longitudinal fulvous band on fore wings is merged into the outer band, this band and the two upper spots being joined together, there being only a slight rounded line and two black spots within the joined space; on the hind wings the outer band is as large as the inner and has a fulvous spot running from its centre into the black submarginal band. The underside is almost exactly similar to *S. hippoclus*, Cram.

Expanse of wings  $1\frac{5}{10}$  inch.

Amboina.

Family *Zygænidae*.*Illiberis discoidalis*, nov.

♀. Antennæ black, with greenish-golden metallic scales on the shafts; frons grey, with golden-orange glittering scales in front of the antennæ; head, thorax, and abdomen black; collar golden orange; a similarly coloured spot on the thorax behind; segmental bands on the abdomen, the tip shining blue-green. Wings hyaline, with black veins; a thick discoidal band closing each cell; marginal black bands uniform in thickness, but not continued on to the abdominal margin of the hind wings; base of both wings suffused with black.

Expanse of wings 1 inch.

Tonkin, Montes Manson, April and May, 2300 feet (*Fruhstorfer*).

Family *Chalcosiidæ*.*Corma mirifica*, nov.

♀. Antennæ, palpi, and head black, crimson immediately behind the antennæ, and the collar crimson all round; thorax, abdomen, and both wings of a uniform dull black; veins of fore wings pale pinkish yellow, veins 1 and 1*a* joined together by a band of that colour before the middle, and a patch of that colour from the costa across the end of the cell to vein 2, like two large round spots joined together, each with a black spot in its centre, and connected by a thin band with the hinder margin; below same as above, except that the veins of fore wings are not marked.

Expanse of wings  $2\frac{1}{10}$  inches.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

Allied to nothing I know of.

## Family Lithosiidæ.

*Asura acteola*, nov.

♀. Head, frons, palpi, legs, and body beneath ochreous; thorax and fore wings scarlet, tinged with ochreous, markings pale black; an erect thin black band in the middle of the fore wings, some very short longitudinal streaks on the inner part of the wings, and some rather longer similar but more distinct streaks forming a band on the disk, parallel with the outer margin: abdomen and hind wings pale ochreous, without markings. Wings on the underside ochreous, tinged with scarlet, without any markings.

Expanse of wings  $1\frac{6}{10}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

*Asura orsova*, nov.

♂. Palpi, thorax, and fore wings bright orange, smeared in parts between the veins with pale scarlet; two transverse blackish bands of short longitudinal streaks—antemedial and discal—neither of them reaching the costa, the former outwardly curved, the latter parallel with the outer margin; abdomen and hind wings ochreous grey, unmarked. Underside of a uniform ochreous grey, with the bands of the fore wings much paler than they are above.

Expanse of wings  $1\frac{6}{10}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

*Asura undulata*, nov.

♂. Palpi, head, and thorax bright ochreous; abdomen ochreous grey, the anal tuft, a little space before it, and the underside blackish brown: fore wings with a black subcostal spot close to the base and a large blackish cloud running through the wing, twice angled towards the costa and twice towards the hinder margin, occupying nearly the whole wing, leaving the margins broadly yellow; hind wings ochreous grey, nearly white. Underside paler, a brown suffused sub-apical mark on hind wings.

Expanse of wings 1 inch.

Khasia Hills (*Hamilton*).

*Eugoa immunda*, nov.

♀. Wings of a dull obscure whitish colour; on the fore wings there are very minute grey striations, a chocolate-coloured basal band, and a similarly coloured marginal band

occupying the outer third of the wing: hind wings with a very obscure greyish marginal band, which occupies half the wing. Underside dull grey, without markings; head and thorax, body below, and legs ochreous.

Expanse of wings  $\frac{6}{10}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

#### Family Nolidæ.

##### *Nola lauta*, nov.

♀. Pale greyish yellow; fore wings with a black dot in the middle of the cell and another at its end, the entire wing sparsely irrorated with very minute brown atoms; lines and markings olive-brown; antemedial and postmedial transverse lines outwardly curved, the former somewhat angled above its middle; a discal band of suffused streaks bends inwards, touches the outer line, and then turns abruptly to the hinder angle; marginal lunules; ochreous cilia, with brown tips: hind wings without markings.

Expanse of wings  $\frac{7}{10}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

Nearest to *N. implens*, Walker, but that species has no inner line to fore wings.

#### Family Limacodidæ.

##### *Thosea sybilla*, nov.

♂. Antennæ and palpi grey; head and body pure white: fore wings with the upper two thirds suffused with chestnut-red, the lower part white; a brown spot at the end of the cell, another below the middle, and some discal brown spots: hind wings ochreous white; cilia of both wings greyish white. Underside without markings, of a uniform ochreous white.

Expanse of wings  $\frac{8}{10}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

There are seven unnamed examples from Singapore in the B.M., Limacod drawer no. 12.

#### Family Drepanulidæ.

##### *Phalacra acutipennis*, nov.

♂ ♀. Wings long: fore wings narrow and produced at the apex, costa rounded before the apex, outer margin nearly straight; hind wings with the outer margin produced and acutely angled at vein 6. Upperside greyish ochreous, with



a pinkish tinge, irrorated with minute brown atoms; a black spot on the middle of the discoidal vein, another at its lower end in all the wings: fore wings with suffused brown bands—basal, medial, and marginal,—the middle band running only a short distance from the hinder margin, leaving the upper disk and spaces between the bands pale, the latter with a crenulated line on each side and a grey suffused line running through them; the outer margin of the outer pale band with black dots: hind wings suffused with brown, with six short pale lines at the base, four towards outer margin, the inner one crenulated, and a crenulated submarginal line; anteciliary line on both wings pale. Underside much brighter ochreous, with the discoidal spots and the outer lines distinct.

Expanse of wings, ♂  $1\frac{2}{10}$ , ♀  $1\frac{1}{2}$  inch.

Khasia Hills. Types in B. M.

Marked somewhat like *Phalacra excisa*, Hmps., but that has angulated fore wings.

### Family Aganaidæ.

#### *Aganais conspicua*, nov.

♂ ♀. Of a uniform dark bright ochreous colour; antennæ and last joint of the palpi black, a black and a white spot at end of first and second joints; legs white with black stripes, a black spot on each shoulder, three or four black dots on abdomen, and a double row beneath: fore wings with a sub-basal black spot on the costa, followed by two pairs, the last on the middle of the costa, a white angulated basal mark, in which are two spots, a spot in the middle of the cell and four or five spots below it, nearly all the spots with white around them.

Expanse of wings, ♂  $2\frac{6}{10}$ , ♀  $2\frac{8}{10}$  inches.

Transvaal (*Crowley Bequest*). Types in B. M.

Not unlike the female of *A. borbonica*, Bois., from Madagascar, but darker and brighter and spots larger and more numerous.

#### *Aganais concolora*, nov.

♀. Of a uniform dark ochreous colour: the hind wings and the underside of both wings slightly paler than the colour of the fore wings above; the wings and body above and below without any markings; the antennæ ochreous brown; palpi black above, end of second joint and all the third joint wholly black, all the tarsi black, fore and middle legs black above.

Expanse of wings  $2\frac{1}{10}$  inches.

Madagascar. Type in B. M.

*Asota spadix*, nov.

♂. Palpi, head, and body dull ochreous: both wings of a uniform dull purplish brown; fore wings with a pale spot at end of cell, and some dull ochreous colour at the base: hind wings also with a pale spot at the end of the cell, and the costal space above, from the base to a little beyond the cell end, pale ochreous, nearly white. Underside: legs and body without markings; the basal half of both wings dull ochreous, the outer half purplish brown.

Expanse of wings  $1\frac{1}{2}$  inch.

Florida Isl., Solomons (*Meek*). Type in B. M.

The shape of the wings is somewhat as in *A. plagiata*, Walker, from Australia; it is a curious-looking insect and is allied to nothing I know of.

*Asota donatana*, nov.

♂. Palpi with the last joint and end of second joint black; head and body ochreous yellow; thorax with some black spots; abdomen with black segmental bands. Wings pure white: fore wings ochreous at the base, with four black spots; a spear-shaped purple-grey mark on vein 1 outside the yellow base, with the white vein running through it; borders of both wings purple-grey, much in accordance with the usual pattern of the *A. plana* group, but in the fore wings the usual two grey spots on the inner edge of the costal border of the fore wings are absent, and the upper white spot towards apex is merged into the central white band; in the hind wings the band is narrow and is divided by the vein ends, and the three interdiscal spots usual in *A. persecta*, Walker, are present.

Expanse of wings  $2\frac{3}{10}$  inches.

Donat Hills, Tenasserim. Type in B. M.

## Family Notodontidæ.

*Pydna hunyada*, nov.

♂. Greyish yellow irrorated with grey, except on the hind wings, which are pure greyish yellow without markings; abdomen with pale segmental bands, the last three segments suffused with blackish brown: fore wings with a brown spot at the end of the cell, three brownish spots near the base, and two on the subcostal vein, one before and the other beyond the middle, a row of submarginal dots, and two pale transverse outwardly curved bands, one before and the other

beyond the middle, the latter much bent inwards before descending to the hinder margin. Underside: wings, body, and legs pure white.

Expanse of wings  $2\frac{2}{10}$  inches.

S. Java, 1500 feet (*Fruhstorfer*).

### Family Noctuidæ.

#### *Cerynea decorata*, nov.

♂ ♀. Frons, palpi, head, and patagia white; thorax, abdomen, and both wings uniform chocolate-brown; abdomen with the first two segments white: fore wings with an antemedial rather broad white band, outwardly angled above its middle, some basal white lines, a white line from the angle to the costa, then bent outwards and downwards, a submarginal sinuous white line joined to the outer margin below the apex, where there is some white suffusion, and again above the middle: hind wings with a white basal space, and white abdominal margin, an inner white line nearly straight, and a discal white line acutely angled to the outer margin at the middle; marginal line of both wings white, with white points.

Expanse of wings  $\frac{9}{10}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

There is a female from Bhutan in the B. M., with *C. reticulata*, Walker, Trifid drawer no. 209.

#### *Corgatha pusilla*, nov.

♀. Palpi, frons, and collar ochreous grey; body and wings above of a uniform chocolate-brown colour; costa of fore wings with four prominent white spots—first at base, second before the middle, third beyond the middle, fourth at the apex; faint indications of antemedial and postmedial bands; marginal line of both wings brown and crenulated, with white points on the fore wings. Underside: wings, body, and legs ochreous white; outer veins grey; a grey, outwardly curved, thin, discal band on the fore wings.

Expanse of wings  $\frac{6}{10}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

There are some examples in the B. M. wrongly named *quadricostaria*, Walker; but that species has only two white spots on the costa of fore wings, the first subbasal and the other in the middle, and is figured from a photograph of the type in Cat. Het. Mus. Oxon. ii. p. 69.

*Metachrostis fausta*, nov.

♂ ♀. Palpi, head, and thorax blackish brown: fore wings with the basal third of the same colour, a pale basal transverse band and another antemedial within the blackish space, which is limited by a pale band edged with black, acutely angled outwards, the reniform stigma being inside the angle, there is also an orbicular visible, the former the larger, both pale with black centres and white eye-speck; the outer part of the wing is pale olive-grey, with blackish diffuse and somewhat large apical spot, and some black marks on the hinder angle: hind wings olive-grey, a black dot at end of cell and some brownish suffusion at the base; both wings with black marginal points.

Expanse of wings  $1\frac{8}{10}$  inch.

Tenasserim, Tandong, 4000 feet, May (*Fruhstorfer*).

Superficially resembles several species of this genus, but is distinguishable by the outer pale band of fore wings having a single angle.

*Hyblæa vasa*, nov.

♂ ♀. First and second joints of palpi below and pectus orange-yellow, with some dark orange hairs; last joint of palpi and first and second joints above black; head and thorax dark chestnut, some dark orange hairs at the base of thorax: fore wings with the basal half and costal apical space, and the whole of the hind wings, black, the remaining lower outer half of fore wings paler pinkish brown, almost exactly as in *H. firmamentum*, Guen.; abdomen black. Underside: fore wings brown, hind wings black, the latter with three thick stripes from the base of bluish white, and three spots above them of the same colour; the female has two bright orange spots on the hind wings, one below the middle of the costa, the other towards the outer margin below the middle.

Expanse of wings  $1\frac{3}{10}$  inch.

Fergusson Isl., D'Entrecasteaux, July (*Fruhstorfer*).

There are two examples from Kiriwini and three from Kapaur in the B. M. unnamed.

*Lineopalpa orsara*, nov.

♂. Head, thorax, and fore wings red-brown: fore wings with a small brown orbicular with a white pupil; reniform like an indistinct whitish figure of eight; two transverse lines, ante- and postmedial, both crenulated and nearly straight: hind wings whitish towards the base, suffused with



dull red outwardly. Palpi, legs, and entire underside pale ochreous grey: fore wings tinged with brown; hind wings with the outer parts similarly tinged, and with a discal row of grey dots.

Expanse of wings  $1\frac{1}{2}$  inch.

Kina-Balu.

*Thyas pallescens.*

*Lagoptera pallescens*, Walker, Journ. Linn. Soc. Lond. vii. p. 179 (1864).

*Thyas pallescens*, Swinh. Cat. Het. Mus. Oxon. ii. p. 144 (1900).

*Lagoptera violetta*, Pag. Abh. Senck. Ges. 1897, p. 449, pl. 20. f. 13.

Type, Sarawak, Borneo, in O. M.

Type (*violetta*), Borneo, in coll. Pagenstecher.

I have it also from Borneo and Singapore, and Mr. Ernest Swinhoe received one from Cherra Punji which is now in coll. Rothschild.

*Plecoptera pellicea*, nov.

♂. Palpi, head, thorax, and fore wings ochreous grey: fore wings with a small black spot on the costa before the middle, a large black angular patch at the middle, its downward point rounded and slightly bent inwards on its outer side; below this patch is a small black spot on vein 2, and there is a black subapical patch with its downward end flattened, followed by a small black spot close to the apex; there are indications of a sinuous discal line: hind wings brown without markings; both wings with indistinct grey marginal lunules, an ochreous marginal line and brown cilia, with a pale interline: abdomen brown with an ochreous anal tuft.

Expanse of wings  $1\frac{4}{5}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

With the black costal marks somewhat as in *P. trimaculata*, Hmps.

*Noorda accensalis*, nov.

♂. Antennæ, palpi, head, and thorax bright orange-red; thorax with some pale yellow spots; abdomen dull reddish ochreous: fore wings pale yellow, with bright orange-red bands, basal, subbasal, medial, discal, and marginal, the last two close together, the others have yellow spaces between them intersected by red longitudinal lines: hind wings white, with a slight red tinge on the outer border.

Expanse of wings  $\frac{6}{10}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

Nearest to *M. ignealis*, Hmps.

*Calesia vinolia*, nov.

♂ ♀. Palpi, frons, face, pectus, thorax below, and legs scarlet; tarsi grey; top of head, thorax, and both wings above of a uniform dark brownish-slate colour, without any markings, except a faintly indicated medial thin band, slightly darker than the colour of the wings, very slightly outwardly curved: the outer portion of the fore wings has in some lights a coppery sheen; the abdomen has the first two segments brown, the rest scarlet; on the underside it is suffused with grey, and the wings are uniformly paler than they are above and without markings.

Expanse of wings 2 inches.

Fergusson Island (*Meek*).

Near *C. pellio*, Felder (Reise Nov. pl. 117. fig. 19), but that species is represented as having the whole of the head and the entire abdomen bright scarlet.

There are two males and one female from Fergusson Island and a pair from Kiriwini, unnamed, in the B. M., Quadrifid drawer no. 152.

*Egnasia franconia*, nov.

♀. Of a uniform dark olive-brown colour above, the wings striated with darker brown: fore wings with three subapical dots on the costa, indications of a postmedial whitish transverse line edged with dark brown, only apparent on the costa and towards the hinder margin; hind wings with a corresponding medial line which is complete: cilia of both wings with a pale interline; both wings with the outer margins crenulate; outer margin of fore wings excised from apex to middle, of hind wings excised between veins 4 and 6: the colour on the underside is much paler than on the upperside, is more or less smeared with white, and the brown striations give it a handsome marbled appearance.

Expanse of wings  $1\frac{5}{10}$  inch.

South Java, 1500 feet, 1896 (*Fruhstorfer*).

Sir George Hampson, in his diagnosis of this genus in his excellent work on the Moths of India, vol. iii. p. 15, incorrectly says that the third joint of the palpi has a tuft of hair on the inner side; this certainly is not the case with the type of the genus, *E. ephyrodalis*, Walker, nor with *rectilinea*, Swinhoe, *accingalis*, Walker, *participalis*, Walker; the only one of Hampson's species in my collection with this tuft is *castanea*, Moore, and this is not a typical *Egnasia*. The whole family of the Focillidæ is much in want of a careful revision.

*Avitta cupienda*, nov.

♀. Antennæ, last joint of palpi, abdomen, and hind wings above black, without markings, the first two joints of the palpi ochreous on their inner sides; the outer sides of the palpi, head, thorax, and fore wings above dark brown-pink, the last with thin indistinct ochreous transverse bands or thick lines, antemedial, inclining outwards, angled below costa, then nearly straight and outwardly edged with brown; another postmedial, deeply angled below costa, then dislocated, then continued to the hinder margin parallel to and shaped like the first line; an apical ochreous indistinct smear, two blackish spots at the end of the cell, marginal line pale, cilia black; the cilia of the hind wings are black with the outer half nearly white.

Expanse of wings  $1\frac{7}{10}$  inch.

Kina-Balu (*Everett*).

*Talapa gebenna*, nov.

♂. Of a uniform dark pinkish-grey colour, sparsely irrorated with brown atoms; indications on the fore wings of subbasal, medial, and discal transverse lines, the last dentated; orbicular a round reddish spot, reniform larger, nearly square, and of the same colour, both indistinct; a black angular subapical spot on the costa: hind wings with an indistinct dentated discal line corresponding to the middle line of the fore wings; outer margin of both wings shaded darker, an anteciliary white line. Underside paler, with a medial outwardly curved line on both wings.

Expanse of wings  $1\frac{6}{10}$  inch.

Siam; Muok-Lek, 1000 feet, January (*Fruhstorfer*); Singapore (*Davison*).

There is an example, without palpi, from Sumatra, in the B. M., unnamed.

*Hypena cremona*, nov.

♂ ♀. Palpi, head, thorax, and fore wing pinkish brown: fore wings with a prominent white spot in the cell of male, a central broad band, slightly darker than the rest of the wing, limited by a subbasal sinuous pale line and a postmedial similar line, the former edged outwardly with brown, the latter edged inwardly; a submarginal series of black dots with white flecks, some distance from the margin: hind wings dark brown without markings.

Expanse of wings  $1\frac{3}{10}$  inch.

Fergusson Island (*Meek*). Types in B. M.

I have in my collection a worn example from the same collector.

### Family Orthostixidæ.

*Celerena siamica*, nov.

♂ ♀. Bright yellow above and below: fore wings with a well-defined purple-grey streak, from the costa across the end of the cell, where it is elbowed acutely outwards to the middle of the discoidal vein, and extends downwards below vein 2; a similarly coloured band on the costa, from the base to the discoidal streak, the outer marginal band paler purple-grey, limited inwardly by a dark purple band, as in the common Indian form *C. divisa*, Walker.

Expanse of wings  $2\frac{4}{10}$  inches.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

Much brighter and of a darker colour than *C. divisa* which it resembles, but the discal streak is clean cut, more acutely angled, and extends below vein 2.

### Family Geometridæ.

*Episothalma cognataria*, nov.

♀. Above dark green, darker than in *E. robustaria*, Guen., but much the same tint of colour; costa of fore wings minutely speckled with yellow, a black dot at the end of each cell, a discal row of white dots across both wings, marginal pale points, whitish cilia, interlined with grey. Underside very pale green, nearly white, marginal line black.

Expanse of wings  $1\frac{4}{10}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

Differs from *E. robustaria* and its allies in the outer margin of fore wings, which is quite even.

### Family Pyraustidæ.

*Pagyda pullalis*, nov.

♂. Pale ochreous brown, bands dark brown: fore wings with an outwardly curved inner band touching both costa and inner margin; a median straight and erect band, from the inner margin to the subcostal vein, where there is a blackish dot; a discal straight band from the costa to vein 3, inclining inwards and joined to the central band by a large brown patch: hind wings with inner and outer erect bands, corre-



sponding to the first two bands on the fore wings ; a sub-marginal, indistinct, brown line on both wings.

Expanse of wings  $\frac{7}{10}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

Allied to *P. arbiter*, Butler. Some of the examples are very little more than half an inch in expanse of wings.

*Bocchoris amandalis*, nov.

♂. Palpi ochreous, top of second joint and the whole of the third joint purple-brown ; head and thorax purple-brown spotted with yellow ; abdomen with the first three segments yellow above, the remaining segments purple-brown, with white segmental bands : fore wings with the costa purple-brown ; both wings with the outer third of the same colour ; the interior of both wings yellow, the fore wings having many yellow spots ringed with purple-brown ; the hind wings with an acute medial transverse purple-brown line, touching a white spot in the middle of the wing, and four yellow spots on the interior border of the marginal band, one near the costa, the other three in the middle, touching each other. Underside of body and legs white ; wings pale, with the upperside markings showing through them.

Expanse of wings  $\frac{8}{10}$  inch.

Siam, Muok-Lek, 1000 feet, January (*Fruhstorfer*).

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LXXIV.—*New Species of Indian Aculeate Hymenoptera.*

By Major C. G. NURSE, Indian Army.

[Continued from p. 403.]

*Pompilus venenatus*, sp. n.

♀. Head and the greater portion of the thorax very closely and finely punctured, the punctures only visible with a microscope ; abdomen smooth and impunctate ; the post-scutellum, episternum and median segment finely and shallowly transversely striate ; head much wider than thorax, clypeus very convex, arched anteriorly, a tubercle behind the base of antennæ, bisected by a longitudinal impressed line, which reaches the anterior ocellus ; thorax when viewed from the side very convex, the pronotum short and rounded anteriorly, median segment emarginate at apex, the sides rounded, with an obscure median longitudinal furrow ; abdomen very convex, second segment with a ventral furrow.

Black: the abdomen, except the extreme base of the first segment, and the legs, except the coxæ, red; pruinose, a very little sparse silvery pile on the clypeus and front. Wings fusco-hyaline, nervures fuscous, tegulæ red; second and third cubital cells subequal at top and bottom, each more than half the length of first cubital cell; legs very long, tarsal claws unidentate.

♂. Similar, but more slenderly built; head much smaller; first abdominal segment sub-petiolate.

Long. 10–12 millim.

*Hab.* Deesa, Mt. Abu; a single example of each sex.

This species would come in Bingham's key on p. 149 next to *P. reflexus*; "*b'*" would then stand as follows:—

"*b'*." Abdomen more or less red.

*a*<sup>2</sup>. Abdomen, except base of first segment, red ..... *venenatus*.

*b*<sup>2</sup>. Only first, second, and third segments red ..... *reflexus*.

*Pompilus kashmirensis*, sp. n.

♀. Smooth and shining; head wider than pronotum, clypeus slightly emarginate in the centre anteriorly, the sides rounded; an impressed line from the base of antennæ to the anterior ocellus; pronotum rather short, rounded anteriorly, median segment rounded posteriorly; abdomen generally shorter than the head and thorax united; legs stout and sparsely spinose, tarsal claws unidentate, the tooth long and conspicuous. Jet-black: the wings fusco-hyaline or sub-fuscous, second and third cubital cells measured on the cubital nervure subequal; third cubital cell subtriangular, sometimes petiolate; apical abdominal segments with a few stiff fuscous hairs.

♂. Similar, smaller, the third cubital cell nearly always petiolate.

Long. ♀ 7–9, ♂ 6–8 millim.

*Hab.* Kashmir, 5000–6000 feet; common.

This species would come into Bingham's key on p. 149 next to *P. ariadne*, from which it differs in being devoid of pile, and in other respects.

*Pompilus Julius*, sp. n.

♀. Smooth, the abdomen somewhat shining, the median segment obscurely transversely striate; head slightly wider than thorax, clypeus very convex, its anterior margin rounded; a faintly impressed line from base of antennæ to anterior ocellus; pronotum short, rounded anteriorly, with a median impressed line; scutellum compressed at the sides,

median segment much below the level of mesonotum and scutellum, rounded posteriorly, and sloping gradually to apex; abdomen about the length of head and thorax united. Red: the antennæ at apex fuscous, and the apical second, third, or fourth segments of the abdomen shading off into black or fuscous; pruinose, in some specimens there is a little silvery pile on the clypeus and front, otherwise almost devoid of pile; apical two segments of abdomen with a few stiff fuscous hairs. Wings hyaline at base, shading off into subfuscous at apex; three cubital cells, the second measured on the cubital nervure longer than the third, which is about half as wide at the top as at the bottom; nervures dark fuscous, tegulæ red.

Long. 10–12 millim.

*Hab.* Deesa, Mt. Abu; not common.

This is closely allied to the three rufous Pompilidæ described by me in the Journal of the Bombay Nat. Hist. Soc. vol. xiv. no. 1, p. 84 (*P. horatius*, *brutus*, and *cassius*). It can be distinguished from all of them by having the median segment red, not black, and the abdomen black or dark fuscous at apex.

*Pompilus Antonius*, sp. n.

♂. Slenderly built, smooth and somewhat shining; head wider than pronotum, very convex in front, clypeus transverse anteriorly; pronotum short, rounded anteriorly, median segment rounded posteriorly; abdomen narrow, as long as head and thorax united, and having a flattened appearance above, the first segment much longer than its width at apex; legs sparsely spinose, the calcaria of intermediate and posterior legs remarkably long. Black: the apex of posterior femora and the whole of posterior tibiæ red; two small sub-lateral spots on second, and a band, narrowed in the centre, at base of third abdominal segment, yellowish white; head, scape of antennæ, and pronotum with somewhat sparse fuscous pubescence; median segment posteriorly and sixth abdominal segment with greyish pile; wings hyaline, slightly infuscated at apex, nervures and tegulæ blackish, the latter with a yellowish-white central spot.

Long. 6–8 millim.

*Hab.* Kashmir, 5000–6000 feet; rare.

Nearest to *P. capitosus*.

*Ceropales Marcia*, sp. n.

♂. Head, thorax, abdomen and legs smooth and pruinose; head wider than thorax, clypeus transverse anteriorly, an

impressed line from the base of antennæ to the anterior ocellus; pronotum short, transverse anteriorly, scutellum and postscutellum conspicuous, raised and convex; median segment gradually sloped, with a median furrow at apex, the sides rounded posteriorly; abdomen about the length of thorax, first segment nearly twice as long as its breadth at apex; third segment shorter than second. Black: the clypeus, except its posterior margin, which joins on to and forms part of a wedge-shaped central mark, a narrow line on the pronotum posteriorly, the anterior tarsi, and all the calcaria yellowish white; the anterior tibiæ and intermediate tarsi reddish testaceous; a little silvery pile on the front and median segment. Wings hyaline, a very faint fuscous cloud across the radial, second and third cubital, and second discoidal cells; nervures and tegulæ blackish.

Long. 5-6 millim.

*Hab.* Kashmir, 6000 feet; Mt. Abu. Rare.

Nearest to *C. albovariegata*.

*Astata lubricata*, sp. n.

♀. Head with somewhat sparse and shallow punctures, the vertex almost impunctate; mesonotum closely punctured anteriorly, more sparsely posteriorly, scutellum shining, with a few punctures, median segment rather coarsely rugose; abdomen shining, finely aciculate microscopically; head with a median impressed line from the base of antennæ to anterior ocellus; pronotum rather long and narrow, scutellum with a median longitudinal impressed line; median segment very long, with an obscure median line, truncate at apex, and very steeply sloped, a median depression just below the base of truncation. Black; the base of the mandibles, scape of the antennæ below, abdomen, and all the legs deep red; wings shining hyaline, apex of the fore wing from just beyond the stigma infuscated, nervures, stigmata, and tegulæ reddish testaceous; head and thorax with somewhat sparse greyish pubescence.

♂. Similar, the median segment more finely rugose, tegulæ yellowish white.

Long. 7-9 millim.

*Hab.* Deesa; not common.

This species would come in Bingham's key in a new section: "C. Abdomen and legs wholly red."

*Tachytes flagellata*, sp. n.

♂. Head and thorax finely and closely punctured; clypeus rounded anteriorly, its anterior margin bare and shining;



the eighth to the eleventh joints of the flagellum of the antennæ remarkably produced on the inside; median segment moderately long, convex, its sides rounded, with a central fovea. Black; the fourth and following joints of the flagellum of the antennæ, and the apical joints of the anterior tarsi, more or less red; the front covered with somewhat thick silvery pubescence; thorax pruinose, with sparse greyish pubescence; abdomen with short and rather sparse silvery pile, pygidium with silvery hairs; wings flavo-hyaline, nervures and tegulæ reddish testaceous.

Long. 11-13 millim.

*Hab.* Mt. Abu; fairly common.

Nearest to *T. vicina*, but the remarkably produced joints of the antennæ are sufficient to distinguish it from any other species.

*Tachytes proxima*, sp. n.

♀ ♂. Thickly covered with golden pile, which to a considerable extent hides the sculpturing, but the head and thorax appear to be closely punctured under it; clypeus rounded anteriorly, front somewhat concave, with an impressed median line reaching the vertex; scutellum and median segment with a median longitudinal impressed line, which on the latter terminates in a hollow or depression, this segment is short, very convex, the sides rounded. Black or reddish black; the femora, tibiæ, and tarsi red; the pile on the clypeus and front is longer and of a brighter golden than elsewhere; head and thorax with some sparse greyish pubescence in addition to the pile; on the abdomen the pile has a tessellated appearance; apical two abdominal segments with a few stiff fuscous hairs; pygidium with bright golden hairs; abdomen below shining, second segment minutely and closely punctured, remaining segments sparsely punctured, all the ventral segments except the first with a few stiff fuscous hairs at apex; wings flavo-hyaline, sometimes very slightly infuscated at apex, nervures flavo-testaceous, tegulæ red.

Long. 13-16 millim.

*Hab.* Deesa; common.

Nearest to *T. taprobanæ*.

*Tachysphex nudus*, sp. n.

♀ ♂. Head moderately closely punctured; mesonotum and scutellum sparsely punctured and shining, median segment above rugose; abdomen very finely and closely punctured, shining; clypeus rounded anteriorly, the front near

the base of antennæ very concave, the portion midway between base of antennæ and anterior ocellus raised, bare, and shining, almost tubercular; that between the ocelli similar; mesonotum broad anteriorly, median segment roundly truncate posteriorly, with a semicircular space in the centre above bare, rugose, and defined by a furrow; apical portion of segment with a median longitudinal furrow; abdomen short, not much longer than thorax. Head and thorax black; mandibles, scape and first joint of flagellum of antennæ, legs, and abdomen red; median segment reddish brown; clypeus and front with thick golden pile; cheeks and sides of median segment with rather short silvery pubescence, which has in some lights a golden tinge; abdomen bare; wings hyaline, with a very faint subapical fuscous cloud across the fore wing, nervures and tegulæ light testaceous.

Long. 7-8 millim.

*Hab.* Deesa; rare.

This species would come into Bingham's key in a new section: "C. Head and thorax black, abdomen red." In appearance it is more like a *Tachytes* than a *Tachysphex*, and the abdomen being bare makes it look at first sight as if it belonged to neither genus.

*Tachysphex pollux*, sp. n.

♂. Head and abdomen closely punctured; mesonotum, scutellum, and postscutellum more sparsely punctured; median segment somewhat finely rugose; clypeus bidentate anteriorly, the space near the ocelli raised and bisected by a longitudinal impressed line; median segment roundly truncate posteriorly; abdomen scarcely longer than thorax, the segments constricted at apex. Black, with silvery pile, thickest on the clypeus and front, elsewhere sparse, forming narrow apical bands on abdominal segments; the anterior tarsi on the underside, and the apical margins of abdominal segments, where denuded of pile, testaceous. The emargination at the base of anterior femora, characteristic of the genus, is conspicuous.

Long. 8 millim.

*Hab.* Deesa; a single specimen.

This species would come into Bingham's key next to *T. testaceipes*, from which it differs in sculpturing and other respects.

*Tachysphex inventus*, sp. n.

♂. Slenderly built; head, mesonotum, and scutellum closely but shallowly punctured; median segment finely

rugose; abdomen finely aciculate; clypeus convex, slightly rounded anteriorly, front concave near base of antennæ, but convex in the ocellar region, with the usual ocellar pad, which is bisected by a longitudinal impressed line, extending from base of antennæ to vertex; median segment truncate posteriorly, the sides slightly rounded; abdomen with the apical margins of segments 1-3 slightly depressed. Black; the tibiæ and tarsi rufo-testaceous; clypeus and front with very short silvery pile, which takes in some lights a golden tinge; thorax with a little greyish pubescence, thickest on the sides of the median segment; abdomen almost entirely devoid of pile or pubescence; wings hyaline, nervures and tegulæ testaceous; the emargination of the anterior femora is conspicuous.

Long. 7-8 millim.

*Hab.* Deesa; not common.

Nearest to *T. pollux* above.

*Tachysphex projectus*, sp. n.

♀. Clypeus anteriorly somewhat sparsely punctured, remainder of head and thorax finely and closely punctured; median segment above very finely longitudinally striate; abdomen smooth and shining; clypeus very convex, transverse anteriorly, an impressed line from the base of antennæ through the ocellar pad to the vertex; median segment rounded posteriorly. Head and thorax black; abdomen red, darker towards the apex; front with very short sparse silvery pile; thorax and legs with a little greyish pile; abdomen bare; all the tarsi more or less rufo-testaceous at apex, and their spines pale testaceous; wings subhyaline, nervures and tegulæ dark testaceous.

Long. 7 millim.

*Hab.* Kashmir, 5000-6000 feet; a single specimen.

Should come in Bingham's key under "*B. b. c'*. Median segment longitudinally striate."

*Tachysphex conclusus*, sp. n.

♀. Head and thorax granular, appearing, when viewed through a microscope, finely and regularly punctured; abdomen finely aciculate; clypeus very convex, rounded anteriorly, and emarginate in the centre, a median longitudinal impressed line from base of antennæ through ocellar pad to the vertex; median segment with the sides compressed at apex; abdomen about the same length as thorax. Black; the mandibles, the first and the greater part of the second abdominal segments, and the anterior tarsi dark red, sparsely

covered with silvery pile ; wings flavo-hyaline, nervures and tegulæ light testaceous.

♂. Similar, the clypeus and front with golden pile, the pile on the mesonotum appearing also golden in some lights ; all the tarsi are more or less rufous, and in some specimens the whole of the second and the basal half of the third abdominal segments are red.

Long. 7–10 millim.

*Hab.* Deesa, Mt. Abu ; not common.

Next to *T. auriceps*, but differs from that species in the sculpturing of the median segment, and in the greater part of the legs being black, not red.

*Trypoxylon responsum*, sp. n.

♀. Head very minutely punctured ; thorax and abdomen smooth ; clypeus rounded anteriorly, its margin slightly curved upwards ; a carina above the base of antennæ, joining on to a furrow from the anterior ocellus ; posterior margin of pronotum slightly constricted ; median segment with a median longitudinal furrow and two lateral convergent furrows, all obscurely transversely striate, the lateral furrows sometimes ill-defined ; abdomen about twice as long as head and thorax united. Black : the apex of the mandibles and the second and third abdominal segments more or less red ; the base of the tibiæ and the whole of the anterior and intermediate tarsi pale testaceous ; clypeus and front from below the emargination of the eyes, side of pronotum and thorax, and sides and apex of median segment with silvery pubescence.

Long. 13 millim.

*Hab.* Mount Abu ; three specimens.

Nearest to *T. canaliculatum*, from which it differs in size and in the clypeus not being carinate.

*Ammophila Smithii* (Baly).

The description of this species, which Bingham had not seen, and which is therefore only quoted by him, leaves much to be desired ; and as I have taken both sexes of an *Ammophila*, which I have little doubt is this species, I take this opportunity of giving a detailed description :—

♀. Head and pronotum almost smooth ; mesonotum and scutellum sparsely punctured ; median segment finely transversely striate in the middle above, the striation difficult to distinguish ; abdomen smooth, pruinose ; clypeus very convex, transverse anteriorly, a median furrow from base of antennæ to anterior ocellus, where it bifurcates in the direction



of the other ocelli; pronotum rather long, the sides rounded posteriorly; mesonotum and scutellum much raised, the former with a median longitudinal line, the latter notched. Head, thorax, fifth segment above, and the whole of the sixth and seventh abdominal segments black; the mandibles, except their tips, the anterior margin of clypeus, scape of antennæ, legs, and abdominal segments 1-4 red; head and thorax covered with a somewhat sparse white pubescence, which hides most of the sculpturing; wings subhyaline, nervures testaceous, tegulæ red.

♂. Similar, smaller; scape of antennæ, legs, and segments 1-4 of abdomen shaded with fuscous, especially the posterior legs, which are in some specimens almost black.

Long., ♀ 19-21, ♂ 14-15 millim.

*Hab.* Deesa, Ferozepore; common.

*Ammophila philomela*, sp. n.

♀. Slenderly built; pronotum and mesonotum transversely, scutellum and postscutellum somewhat coarsely longitudinally, median segment in the centre above finely longitudinally striate; abdomen smooth; head covered with fine silvery pubescence which hides the sculpturing; pronotum very long, gradually widening towards apex; the striation of the median segment does not show up clearly in all specimens, as the whole of the thorax is covered with a short but rather thick whitish pubescence, which gives it a frosted appearance; abdomen and legs pruinose, petiole of abdomen two-jointed. Red; the flagellum of the antennæ and the tips of the mandibles more or less black; the head and median segment appear dark, but their colour is difficult to determine owing to their being covered by pubescence; apical two or three segments blackish above; wings hyaline, nervures dark testaceous, tegulæ red.

Long. 18 millim.

*Hab.* Deesa; common.

This species would come into Bingham's key under "*A. a. a'*," new section *c*<sup>2</sup>. "Median segment finely longitudinally striate along the middle."

*Ammophila durga*, sp. n.

♀. Head and thorax closely punctured, except in the region of the ocelli, where the punctures are somewhat sparse; abdomen and legs smooth and pruinose; clypeus much produced, its apex bisinuate, the sides rounded; an impressed

line, ending in a deep furrow, from base of antennæ to anterior ocellus; pronotum with the apical margin depressed; mesonotum with a median impressed line; median segment rounded at apex, gradually sloped, finely rugose, with a granular appearance, in some specimens running into transverse striæ; petiole of abdomen one-jointed, the petiole about one third the length of the whole abdomen. Black; the abdomen, except the petiole, red, becoming darker, almost black, at apex; head and thorax with rather long white pubescence, that on the front intermixed with a few black hairs, the vertex almost bare; wings hyaline, very faintly fuscous at apex, nervures and tegulæ rufo-testaceous. I cannot discover a tooth in the tarsal claws.

♂. Similar, more slenderly built, the head much smaller; clypeus only about half the width of that of the female.

Long. 16 millim.

*Hab.* Murree to Kashmir road, about 4000 feet; three or four specimens.

This species would come into Bingham's key as a new section, "Tarsal claws non-dentate."

*Ammophila basalis* (Smith).

The male of this species has not hitherto been described. It resembles the female, but all the legs are black. The amount of red on the abdomen varies considerably, and I have some specimens in which the abdomen is entirely black, except the ventral portion of the second segment. This species is very closely allied to *A. atripes*, both having the legs red in the female and black in the male. In fact the only reliable character by which they can be separated is that *A. basalis* has the basal portion of the median segment transversely striate, and not reticulate. So far as I have observed, there is little or no difference in size.

*Hab.* Deesa, Mt. Abu; common.

*Psen kashmirensis*, sp. n.

♀. Smooth and shining, with a few minute punctures on the vertex and mesonotum; clypeus short, transverse anteriorly; antennæ clavate; second joint of flagellum about half as long again as the third, the portion of the front between the bases of antennæ raised into a remarkable tubercle; eyes slightly convergent below; median segment with a triangular depression at base, with outwardly divergent striæ, and produced into a deep median longitudinal

furrow, the apex of the segment rounded; petiole short, about half the length of thorax, remainder of abdomen about the length of the head and thorax united. Jet-black, sparsely covered with silvery pubescence, which hides the sculpturing of the clypeus and front; wings hyaline, nervures and tegulæ black; second cubital cell much narrowed above, subtriangular.

♂. Similar, the antennæ filiform, and about twice as long as in the female; no tubercle between bases of antennæ; sides of median segment finely obliquely striate; tarsi pale testaceous.

Long. 7-8 millim.

*Hab.* Kashmir, 5000-8000 feet; three specimens.

*Gorytes lenis*, sp. n.

Smooth and shining, a few shallow punctures about the region of the ocelli and on the mesonotum; eyes strongly convergent below; antennæ clavate; clypeus much longer than broad, transverse anteriorly, an impressed line from the base of antennæ to the anterior ocellus, the region of the ocelli somewhat raised; pronotum very short; mesonotum with two parallel median longitudinally impressed lines; median segment somewhat steeply sloped, the triangular space at its base smooth and shining; abdomen petiolate, petiole about one third of the total length of the abdomen, not increasing in width at apex, the base of the second segment slightly narrower than the petiole. Black: the clypeus and front as far as the base of the antennæ, the scape, except its extreme base, a line on the pronotum posteriorly, a spot near the tegulæ, the postscutellum, an apical line, emarginate in the centre, on first abdominal segment, a line on the apex of second abdominal segment, widening laterally, and emarginate, sometimes interrupted, in the centre, and the apical margin of the fourth segment narrowly pale yellow; antennæ reddish below; legs red; the anterior and intermediate tibiæ at base, a line on all the tibiæ above, and the tarsi yellow; clypeus with silvery pile; median segment, except the triangular space at base, and abdomen pruinose; apical abdominal segments with short stiff greyish pubescence; wings clear hyaline, nervures black, tegulæ red with a yellow spot.

Long. 12 millim.

*Hab.* Deesa; not common.

Next to *G. alipes*, from which it may be distinguished by

its longer and more slender petiole, and by all the femora being red.

*Stizus conscriptus*, sp. n.

♀. Somewhat slenderly built; head with a few shallow punctures; thorax strongly and rugosely punctured; abdomen shining, finely aciculate; clypeus very convex, almost rectangular, emarginate anteriorly, the front above it concave, with a carina between bases of antennæ; eyes convergent below, the distance separating them there being about half the distance between them at vertex; median segment roundly truncate posteriorly; spines of anterior tarsi very long. Black; the mandibles, except their tips, the labrum, clypeus, basal half of the antennæ, legs, and abdomen more or less red; the amount of red in different specimens varies a good deal, and sometimes it is almost entirely confined to the abdomen; a little silvery pile on clypeus and front, and some sparse greyish pubescence on median segment; wings fuscous, the posterior margin of hind wing hyaline, nervures black, tegulæ red.

♂. Similar, the eyes less convergent below; the spines of anterior tarsi short.

Long. 12–16 millim.

*Hab.* Deesa; fairly common.

Next to *S. vespiformis*, from which it differs in size, and in having the thorax strongly punctured.

*Stizus coloratus*, sp. n.

♀. Stoutly built; head finely, but not very closely, thorax minutely and closely punctured, the punctures on both very shallow; sides and apex of median segment finely rugose, abdomen finely aciculate; head not so wide as thorax, clypeus slightly emarginate anteriorly; labrum, clypeus, and the middle portion of the front above the latter, as far as the base of antennæ, distinctly convex; the sides of the front from the posterior angles of the clypeus to the base of antennæ concave; median segment short, concavo-truncate posteriorly, the sides rounded. Mandibles light red at base, black at apex; labrum, clypeus, and front yellow, shading off into light red on the cheeks and vertex; two maculæ behind the antennæ, the region of the ocelli, and the posterior portion of the head below the vertex, black; thorax black, the pronotum, sides of the mesonotum, scutellum, and a spot on the mesopleuræ dark red; second and third abdominal segments bright yellow, the remaining segments black; the margins of first to



third segments narrowly black or reddish black; scape of antennæ yellowish, flagellum red; femora, tibiæ, and tarsi of the legs, and sometimes also the coxæ and trochanters, red; the whole insect is more or less covered with short, sparse, greyish pile, which becomes golden on the inside of the posterior tibiæ and tarsi. Wings brownish fuscous, shading off gradually into hyaline at apex and along the posterior margin of hind wing; nervures testaceous, tegulæ red.

♂. Similar; the third abdominal segment with two large yellow maculæ, the apical joint of the antennæ curved.

Long., ♀ 23, ♂ 18–20 millim.

Hab. Mt. Abu; common.

*Stizus imperator*, sp. n.

♀. Stoutly built; the vertex of head with a few shallow punctures, and the sides and apex of median segment coarsely but shallowly punctured; head narrower than thorax; clypeus rather short, slightly emarginate anteriorly; labrum, clypeus, and the middle portion of the front above the latter as far as the base of the antennæ convex, the sides of the front from the posterior angles of the clypeus to the base of antennæ concave; pronotum very short, median segment short, concavo-truncate posteriorly, the sides rounded. Light red, shining; apex of mandibles and of the third abdominal segment, and the whole of the following segments, black; the tarsi sometimes shaded red and black; a little short white pubescence on the front and median segment, some golden pile on the inside of the posterior tibiæ and tarsi, and a little fuscous pubescence on the apical two abdominal segments. Wings fuscous, the outer margin of both wings narrowly hyaline; nervures dark testaceous, tegulæ red.

♂. Similar, the clypeus comparatively longer, the apex of flagellum of antennæ slightly curved.

Long. 18–20 millim.

Hab. Deesa; rare.

Both this species and the last would come into Bingham's key under a new sub-section as follows:—

A.

d. Wings narrowly hyaline along outer margin.

a'. Second abdominal segment yellow ..... *coloratus*.

b'. Second abdominal segment red ..... *imperator*.

*Bembex irritata*, sp. n.

♀. Stoutly built; head smooth, clypeus and vertex with

a few minute punctures: thorax minutely, closely, and shallowly punctured, appearing very finely rugose; abdomen finely aciculate; clypeus very convex, almost triangular, its anterior margin very slightly emarginate; front above the clypeus very concave, a slight carina between the bases of antennæ; apical abdominal segment shining, sparsely punctured. Pale orange-red, abdomen above reddish yellow; the apex of the mandibles, the greater part of the central portion of the front from the base of antennæ to the vertex, the vertex narrowly, the posterior portion of the head, except a narrow line along the outer orbits of the eyes, the mesonotum, except its sides and two short and faint longitudinal lines on its disk, the base of the scutellum broadly, the postscutellum, the median segment, except a crescent-shaped mark, interrupted in the centre, and the extreme lateral angles of the segment, the coxæ of all the legs, the apical abdominal segment above, and the greater part of the first, third, and following segments below, black; the margins of the abdominal segments are darker red than the rest of the segments, and there are faint indications of red maculæ on the lighter portion; the flagellum of the antennæ is rufous; clypeus and front covered with silvery, and the thorax with sparse greyish pubescence; wings subfuscous, becoming gradually lighter towards their apical margins, which are hyaline.

♂. Similar; the apical joints of antennæ spined; a very large and prominent median tubercle on the second ventral segment; two conspicuous carinæ meeting apically and forming a wedge-shaped prominence on the sixth ventral segment; labrum, clypeus, and scape of antennæ pale yellow, flagellum of antennæ dark rufo-testaceous; many of the orange-red markings on the thorax obsolete or obsolescent.

Long. 16-17 millim.

*Hab.* Deesa; rare.

This species would come into Bingham's key in a new section: "B. c. Colours black and light red; abdomen reddish yellow."

*Cerceris kashmirensis*, sp. n.

♀ ♂. Head, pronotum, mesonotum, and scutellum closely and somewhat finely punctured, the punctures running into striæ; postscutellum impunctate, the enclosed space at the base of median segment varies considerably, in most specimens it has outwardly divergent striæ, in some it is almost entirely smooth; sides of the median segment coarsely rugosely

punctured; abdomen somewhat coarsely punctured, the punctures very deep and distinct in the middle of each segment, less so at the base and apex; head wider than thorax, clypeus slightly concave anteriorly, convex posteriorly, its anterior margin transverse in the centre, emarginate on each side; a short carina between the antennæ, which are set in a hollow; first abdominal segment forming a petiole, which is about as broad as long, second segment about twice as broad, and equal in length to the first; third and fourth somewhat shorter than the second, but equal to it in breadth, fifth rather narrower than the second, third, and fourth; pygidial area finely punctured. Black; the mandibles, except their tips, the clypeus, except its anterior margin narrowly, the front above the base of antennæ, but not including the hollows in which the base of antennæ are placed, or the antennal carina, a spot on each side of the pronotum posteriorly, the tegulæ, postscutellum, a broad band at the base of second abdominal segment, and the apical margins of the third, fourth, and fifth segments, yellow; the third ventral segment has a large, irregular, yellowish macula on each side, and there is a trace of similar markings on the fourth ventral segment; legs with the coxæ almost entirely black, anterior trochanters black, intermediate and posterior yellowish red; femora black at base above, remainder, as well as the whole of the tibiæ and tarsi, yellowish red; scape of antennæ yellow or red below, flagellum red below; wings fusco-hyaline, nervures dark testaceous.

Long. 8-12 millim.

*Hab.* Kashmir, 5000-6000 feet; fairly common.

Would come into Bingham's key after *C. pentadonta*.

*Cerceris dolosa*, sp. n.

♀. Head, thorax, and abdomen closely and regularly, but somewhat coarsely punctured, the punctures on clypeus and front being shallower than elsewhere; clypeus excavate anteriorly, its margin subporrect, antennal carina rather long; the triangular space at the base of median segment longitudinally striate at base, obliquely at the sides, its median furrow transversely striate; first abdominal segment slightly longer than broad, less than half the width of second segment, the whole abdomen as long or slightly longer than head and thorax united. Black; the base of the mandibles, a central spot on the clypeus, the sides of the eyes as far as the base of the antennæ, the scape in front, a narrow band on the

apical margin of the third abdominal segment, widened at its extreme lateral margin till it covers the whole of the ventral segment, an apical spot on the fifth segment, and the anterior and intermediate tarsi, pale yellow; flagellum of antennæ beneath rufous; coxæ, trochanters, and basal portion of the femora of all the legs red; the apical portion of the femora blackish, the tibiæ variegated with black, red, and yellow; posterior tarsi with the first joint pale yellow, remainder fuscous; the clypeus and front are covered with a short, stiff, silvery pubescence. Wings hyaline, very slightly infuscated at apex; nervures and tegulæ blackish, the latter with a central yellow spot.

♂. Similar, smaller, the clypeus less excavate anteriorly, and its margin not subporrect; the mandibles entirely black; the yellow apical spot is on the sixth, not the fifth, segment.

Long. 8–11 millim.

*Hab.* Mt. Abu; common.

Would come into Bingham's key after *C. bifasciata*, under a new sub-section, "Enclosed space at base of median segment longitudinally striate at base, obliquely at sides."

[To be continued.]

#### BIBLIOGRAPHICAL NOTICE.

*Catalogue of the Collection of Palearctic Butterflies formed by the late John Henry Leech, and presented to the Trustees of the British Museum by his Mother, Mrs. Eliza Leech.* By RICHARD SOUTH, F.E.S. London: Printed by Order of the Trustees, 1902. 4to. Pp. vi, 229, Portrait, and 2 Coloured Plates.

THE death of so energetic an entomologist as the late Mr. Leech, at the comparatively early age of thirty-eight years, may well recall the words of Mr. H. T. Stainton respecting Dr. Brackenridge Clemens:—"Little did I think, when I received his first letter in 1857, two years before he became an author, that his career was to be so brilliant and so short." Far more appropriately might similar words be applied to Mr. Leech.

Devoted to the study of entomology from his schoolboy days (largely, we believe, through the encouragement of his mother), and possessed of ample means, and untrammelled by a profession, he devoted his life to travelling, and to the formation, by his own efforts and by those of skilled assistants, and the purchase of large special collections, to the formation of the great collection of



Palæarctic Lepidoptera which Mr. South has catalogued in the volume before us. A short preface gives an account of Mr. Leech's life, travels, and collections; and from it we learn that he successively visited Para, Marocco, the Canaries, Madeira, China, Corea, Japan, and the North-western Himalayas, everywhere collecting and observing.

The collection, as presented by Mrs. E. Leech to the British Museum and catalogued by Mr. South, consists of 18,000 specimens, representing 1100 species. The most valuable portion consists of the materials used in the preparation of Mr. Leech's great work on the butterflies of China, Japan, and the Corea, and of the fine series of varieties and aberrations, chiefly European, a selection of the latter being represented on the two coloured plates of the volume.

Those who knew Mr. Leech personally will be pleased with the excellent portrait which forms the frontispiece; and it is a matter for real thankfulness to entomologists that Mr. Leech was not only enabled to do such excellent scientific work during his lifetime, but that his valuable collection should have found a permanent resting-place in the Natural History Museum at South Kensington after his death.

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#### MISCELLANEOUS.

*On the Evolution of the Proboscidea.* By C. W. ANDREWS, D.Sc.

UNTIL the author's recent discoveries of primitive Proboscidea in the Middle and Upper Eocene formations of the Fayum, Egypt, the oldest known members of this mammalian order were *Dinotherium Cuvieri* and *Tetrabelodon angustidens*, from the base of the Miocene in France. The new Egyptian fossils not only reveal for the first time the early history of the order, but also provide more satisfactory material for the discussion of its evolution than has hitherto been available.

The most important changes in the Proboscidea occur in the skull, mandible, and dentition.

Owing to the increase in the size of the tusks and to the presence of the proboscis, the facial region of the skull becomes shortened, and at the same time the premaxillæ become wider. The presence of the proboscis also accounts for the position of the external nares. The demand for a greater surface of attachment for the muscles supporting a skull rendered heavy by the tusks and trunk is met by the great development of the diploë in certain of the cranial bones, resulting in the enormous expansion of the forwardly sloping occipital surface. The maxillæ become greatly enlarged concomitantly with the increase in the size and degree of hypselodonty of the molars. At the same time the zygomatic arch becomes weaker and the jugal takes a smaller share in its composition.

The mandible is at first short and stout, with a massive symphysis. Afterwards it becomes more and more elongated as the stature of the animals increases; and this elongation is for the most part effected by the lengthening of the symphysial region, though the backward rotation of the ascending ramus tends to the same end. The prolongation of the mandible beyond the premaxillæ must have been covered by a proboscis-like structure composed of the upper lip and nose, probably more or less prehensile at its extremity. The lengthening of the mandible seems to have reached its maximum degree in the Middle Miocene, after which it again became shortened by the reduction of the symphysis, while the fleshy and now mobile proboscis was left behind as the sole organ of prehension.

In the upper dentition the chief changes are the loss of incisors nos. 1 and 3 and the great increase in size of incisor no. 2, which eventually forms the great tusk characteristic of the later Proboscidea. The canines are soon lost. In the earliest forms some at least of the cheek-teeth (milk-molars) are replaced by premolars in the usual manner, and these teeth remain in wear simultaneously with the true molars; but in later forms no vertical succession takes place, and as the milk-molars are worn they are shed, being replaced from behind by the forward movement of the molars. Of these also the anterior may be shed, until at length in old individuals of the later types the last molar is alone functional. The gradual increase in the complexity of the Proboscidean molars is one of their most striking characteristics. All stages can be traced between the simple, brachyodont, bilophodont (quadritubercular) molars of *Moeritherium* (Middle Eocene) to the extraordinarily complex type of tooth found in *Elephas*. Thus in *Palæomastodon* (Upper Eocene) the molars are trilophodont, and the same is true of the first and second molars of *Tetrabelodon* (Miocene), in which, however, the last molar is complicated by the addition of further transverse crests. In the Stegodonts of the Siwalik Hills (Pliocene) a further increase in the number and height of the crests takes place, and the whole crown of the tooth is more or less covered with a thick coat of cement. Still later the transverse crests become highly compressed laminæ united by cement, and these are as many as twenty-seven in number in the Pleistocene *Elephas primigenius* and the recent *E. indicus*.

The evolution of the lower molars corresponds with that of the upper molars. Of the lower incisors the middle and outer pairs (nos. 1 and 3) are soon lost, but the second pair remains functional for a long geological period. When the symphysis becomes shortened these incisors are sometimes retained as vestiges (*e. g.* in *Mastodon americanus*), but in the genus *Elephas* they have completely disappeared.—*Abstract of paper read before the Royal Society on March 26th, 1903.*

# THE ANNALS

## MAGAZINE OF NATURAL HISTORY.

AND

[SEVENTH SERIES.]

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LXXV.—*New Species of Indian Aculeate Hymenoptera.*  
By Major C. G. NURSE, Indian Army.

[Concluded from p. 526.]

*Crabro gulmargensis*, sp. n.

♀. Head as wide as thorax; clypeus short, carinate in the centre, its anterior margin subporrect; front above the base of antennæ very concave, smooth and shining, the carina of the clypeus produced along the front; the smooth portion of the front reaches about halfway from the base of antennæ to ocelli; the remaining portion, as far as the ocelli, very finely longitudinally striate, the vertex behind the ocelli shining, with sparse and very fine punctures; pronotum very finely longitudinally striate, its apex notched in the centre; mesonotum finely rugose anteriorly, finely longitudinally striate posteriorly; scutellum smooth and shining, with a few scattered punctures; postscutellum finely punctured; median segment, which is very much below the level of mesonotum, coarsely longitudinally striate in the centre, finely obliquely striate at the sides; abdomen not petiolate, but gradually widening to the third segment, smooth and shining, pygidial area finely punctured. Black; the scape of the antennæ, except a small spot at its base above, two apical spots, not quite meeting in the centre, on the pronotum, a spot on the

scutellum, subapical bands on segments 1-4, those on segments 2 and 3 interrupted medially, a somewhat wider apical band on the fifth segment, the apex of the anterior femora, and the tibiæ and tarsi of all the legs, yellow, the latter sometimes yellowish red; the clypeus, and sometimes the scape, is covered with long silvery pubescence, which is stiff on the former and hides its sculpturing; the remainder of the head and thorax, and the femora of the legs, are sparsely covered with rather long pubescence, which is black above and greyish below; fifth abdominal segment and pygidium with short stiff hairs, which in some lights appear golden in tint. Wings fusco-hyaline, with a flavous tinge; nervures testaceous, tegulæ black.

♂. Similar, but the scape and the first seven or eight joints of the antennæ are much dilated, and the formation of the anterior legs is very remarkable; the tibiæ are irregularly widened, and the first joint of the tarsi is flattened, forming a large oval excrescence, shaped like an inverted saucer, smooth and shining.

Long. 8-14 millim.

*Hab.* Gulmarg, Kashmir, 8000-9000 feet; fairly common.

This species would come in Bingham's key in section B, under a new sub-section. The size in both sexes varies considerably, and the markings are frequently orange-red, many of them being in some specimens quite obsolete.

*Eumenes placens*, sp. n.

♀. Clypeus with sparse shallow punctures; remainder of head, thorax and first abdominal segment closely and finely punctured, second abdominal segment with still finer punctures; clypeus broad, very convex, reaching well below the eyes, its anterior margin deeply emarginate; the carina between bases of antennæ grooved posteriorly; a median longitudinal impressed line at base of mesonotum, and a median longitudinal carina on scutellum at base, ending in a hollow at apex; median segment convex, nearly vertical, with a groove down the middle, the groove not much broadened below; petiole of abdomen about the same length as the thorax, very narrow at base, increasing in width just before the centre, at apex more than twice as wide as at base, having lateral tubercles about the middle, and an obscure median longitudinal groove along the wider portion. Head and thorax black; abdomen dark red; the mandibles, except their extreme base, clypeus, except a central spot, scape below, antennal carina, a narrow line from the clypeus along the inner orbits reaching



their emargination, a narrow line along the outer orbits reaching the vertex, the greater part of the pronotum, two lateral spots narrowed posteriorly on the mesonotum, a large mark on the mesopleuræ, a spot behind the tegulæ, the scutellum, the posterior half of the postscutellum, large sublateral maculæ on the median segment, two sublateral spots about the middle and the apical margin narrowly of the first abdominal segment, a narrow subbasal band, medially interrupted, and a somewhat wider apical band, widest above but medially interrupted, on the second segment, the apices of the following segments (which are, as usual, withdrawn telescopically in the type specimen), and the greater part of the anterior legs below, yellow; the yellow markings on the abdomen are not very clearly defined; antennæ and legs light red. Wings hyaline, the costal margin of fore wing with a flavous tinge; nervures black, except at the base of the wings, where they are testaceous; tegulæ yellow.

Long. (to end of second abdominal segment) 12 millim.

*Hab.* Murree-Kashmir road, about 4000 feet; a single specimen.

This species would come into Bingham's key in group B on p. 335.

*Eumenes viatrix*, sp. n.

♂. Clypeus and front smooth, vertex of head and thorax closely but shallowly punctured, first abdominal segment somewhat sparsely punctured above; clypeus long, slightly convex, its anterior margin transverse and reaching below the lower portion of eyes; the front between the bases of antennæ slightly raised; a well-marked longitudinal impressed line terminating at the anterior ocellus; a similar line on the mesonotum, not reaching its apex; scutellum slightly notched; median segment with a central groove, widening at apex into a deep hollow; first abdominal segment with small lateral tubercles. Head and thorax black; abdomen red; the mandibles, clypeus, and front as far as the base of antennæ, the emarginations of the eyes, a narrow line on the outer orbits, the pronotum except its posterior lateral margin, two short longitudinal lines on the mesonotum, a large mark on the metapleuræ, two large spots on the scutellum, a median transverse line on the postscutellum, the sides of the median segment, two obscure sublateral spots on the petiole and a band at its apex, somewhat obscure narrow apical bands on segments 2 to 6, the greater portion of the anterior legs, the coxæ and femora below, and the tibiæ above of the intermediate and posterior legs, yellow; the remainder of the

intermediate and posterior legs red or reddish. Wings subhyaline, their costal margins with a flavous tinge; tegulæ yellow, nervures black.

Long. (to end of second abdominal segment) 15 millim.

*Hab.* Murree-Kashmir road, about 4000 feet; a single specimen.

This species would come into Bingham's key in group "C. *b*."

*Odynerus præclusus*, sp. n.

♀. Head and thorax somewhat closely punctured; abdomen smooth; clypeus produced anteriorly, its apex transverse, antennal carina short; thorax wider anteriorly than posteriorly, median segment gradually sloped, its apex rounded; first abdominal segment nearly twice as broad as long. Black; two lateral marks on the clypeus anteriorly, its posterior margin, scape of antennæ in front, a small triangular spot at the top of the antennal carina, continued posteriorly in a line which stops just short of the anterior ocellus, the emargination of the eyes, a line on the outer orbits, a spot on each side of the vertex, a line on the pronotum anteriorly, sublateral spots on the median segment, and narrow apical bands on the first and second abdominal segments, yellow or greenish yellow; the band on the second abdominal segment is bisinuate above and continued below, where it forms two large maculæ, not quite touching one another in the centre; mandibles and legs red, the latter with yellow markings. Wings hyaline, nervures black; tegulæ yellow anteriorly and posteriorly, in the centre black.

Long. 6-7 millim.

*Hab.* Mount Abu; not common.

This species would come into Bingham's key after *O. intendens*.

*Odynerus sequestratus*, sp. n.

♀. Head and thorax finely and closely punctured; abdomen smooth; clypeus with its anterior margin produced, very narrow, and incised at apex; postscutellum rounded posteriorly, median segment depressed, vertical, its sides rounded, its centre very concave; first abdominal segment cup-shaped, about  $1\frac{1}{2}$  times as broad as long, slightly narrower at apex than second segment. Black; the mandibles except their tips, the clypeus except a spot in the centre, a coronet-shaped mark above it, the scape below, the sinus of the eyes, a line along both outer and inner orbits, not meeting at the

vertex, a broad band on the pronotum, an oval medial apical spot on the mesonotum, two lateral spots on the scutellum, the postscutellum, large oval lateral spots on the median segment, subbasal lateral free spots on the second abdominal segment, an apical band (broadest in the centre) on first, and bisinuate apical bands (broadest in the centre) on the remaining abdominal segments, the coxæ of all the legs, femora of anterior and intermediate legs, tibiæ and tarsi of the anterior and tibiæ above of the intermediate and posterior legs, yellow; base of first abdominal segment and sometimes the centre of the median segment red; legs, where not yellow, red or reddish testaceous. Wings hyaline, nervures black, tegulæ yellow.

♂. Similar, slightly smaller, the clypeus wholly yellow; the yellow mark on the inner orbit only in the sinus of the eyes.

Long., ♀ 8, ♂ 6.5 millim.

*Hab.* Deesa; not common.

This species is closely allied to *O. diffinis*, from which it differs in having the abdomen smooth and the wings hyaline, besides in some of the markings.

*Odynerus hostis*, sp. n.

♀. Very stoutly built; head, thorax, and abdomen closely but shallowly punctured, the punctures on the vertex and mesonotum closest, but those on the apex of the second abdominal segment deepest; clypeus subovate, very convex, its anterior margin incised; bases of antennæ situated in a deep hollow, a median longitudinal impressed line from between them to the anterior ocellus; a similar line on basal half of mesonotum; median segment very short, concave in the centre, the sides rounded; first abdominal segment twice as broad as long. Dark red or reddish black; the clypeus, a coronet-shaped mark above it, the scape in front, a line along both the inner and outer orbits, not quite meeting at the vertex, the pronotum anteriorly, a large mark on the episternum, a spot behind the tegulæ, the lateral margins of the scutellum, the postscutellum, the apices of abdominal segments 1-5, and large lateral spots, joining on to and forming part of the apical bands, on segments 1 and 2, yellow; the region of the ocelli, a median spot on the first abdominal segment, and the base and centre of the second and following segments black or blackish; legs light red or yellowish red. Wings subhyaline, the margins, especially the costal margin, slightly infuscated; tegulæ red or yellowish red; nervures black, except those at the base of the wings, which are testaceous.

♂. Similar, but the clypeus has a deep semicircular excavation anteriorly, the apices of the antennæ are yellowish, and the ground-colour of the head and thorax is black; the tibiæ and tarsi are yellow, and in some specimens there are sublateral yellow spots on the median segment.

Long. (to end of second abdominal segment) 9–10 millim.

*Hab.* Mount Abu; very common.

Next to *O. guttatus*. The male bears a strong superficial resemblance to a large edition of *O. ovalis*; but, apart from size, the present species may be distinguished from *O. ovalis* by its broader clypeus, with a much deeper emargination at apex, and by the scutellum, which is only yellow at the lateral angles.

*Odynerus segregatus*, sp. n.

♀. Rather stoutly built; vertex of head, thorax, and second and following abdominal segments somewhat coarsely punctured, clypeus and front finely and shallowly, first abdominal segment sparsely and shallowly punctured, sides of median segment rugose; clypeus subpyriform, its apex incised, the portion of the front between the bases of antennæ raised, with an impressed median line posteriorly; median segment vertical, concave, its sides truncate or produced backwards; first abdominal segment nearly twice as broad as long, its apex as wide as second segment. Black; the mandibles at base, clypeus and front, except a spot behind the base of each antenna, and a line along the outer orbits, a broad band on the pronotum, a spot on the episternum, the lateral angles of the scutellum, the postscutellum, and apical bands on first, second, and third abdominal segments, yellow; the band on the first segment is incised in the middle and slightly widened at the sides, that on the second segment is bisinuate, widened at the sides, and continued below, where it covers nearly the whole of the segment, that on the third segment is bisinuate above and below; base of first abdominal segment red; legs red, variegated with yellow. Wings hyaline, nervures black, tegulæ yellow.

Long. (to end of second abdominal segment) 9 millim.

*Hab.* Deesa; a single specimen.

This species would come into Bingham's key next to *O. fistulosus*.

*Prosopis kashmirensis*, sp. n.

♀. Clypeus and front sparsely, vertex and thorax minutely, abdomen shining, very minutely punctured; enclosed space



at base of median segment very finely rugose, with a few longitudinal striæ at base; clypeus reaching very little below lower margin of eyes, front between bases of antennæ sub-tuberculate; three longitudinal lines on basal portion of mesonotum; sides of median segment rounded, an impressed median line on the apical portion of the segment. Black; a wide subtriangular mark along the inner margins of the eyes as high as the base of antennæ, a medially interrupted line on the pronotum, a spot below the base of the wings, and all the tibiæ at base, yellow; thorax posteriorly, tibiæ and tarsi with greyish pubescence. Wings hyaline; nervures and tegulæ testaceous, the latter anteriorly yellow.

♂. Similar; the whole of the clypeus and front, as high as the base of antennæ, and the base of the posterior tarsi yellow.

Long. 5 millim.

*Hab.* Kashmir; three specimens obtained between 6000 and 8000 feet.

This species would come into Bingham's key after *P. mustela*.

*Prosopis gujaratica*, sp. n.

♀. Stoutly built; clypeus and front finely aciculate, vertex and thorax with minute punctures, enclosed space at base of median segment finely reticulate at base, coarsely at apex; abdomen shining, finely aciculate; clypeus reaching only slightly below the lower margin of eyes, its anterior margin rounded; the front between the bases of antennæ almost flat, with a median longitudinal line; two short, parallel, sublateral lines on mesonotum. Black, the abdomen with a castaneous tinge; a broad line on the inner orbits, not quite reaching the vertex, a line on the pronotum, the tubercles, tegulæ, apex of femora, and the whole of the tibiæ and tarsi of all the legs, bright yellow; flagellum of antennæ dark testaceous; abdomen posteriorly, tibiæ, and tarsi with a little greyish pubescence. Wings hyaline and iridescent; nervures testaceous, those near the stigma darkest.

Long. 4.5 millim.

*Hab.* Deesa; fairly common.

Nearest to *P. mustela*.

*Prosopis repentens*, sp. n.

♀. Head and thorax with very minute punctures; abdomen impunctate, slightly shining; clypeus reaching a little below the lower margin of eyes, its apex slightly excavate;

three parallel impressed lines on mesonotum—one median, basal, two sublateral; median segment rounded posteriorly, its base smooth or with very minute punctures. In colouring and as regards the wings this does not differ from the preceding species. It has, however, a little snow-white pubescence on the sides of the median segment, and a line of similar pubescence on each side at the apex of the first abdominal segment, in the latter respect being similar to many European species of the same genus.

Long. 4–4.5 millim.

*Hab.* Deesa; fairly common.

Nearest to *P. gujaratica* above, but the different sculpturing of the median segment renders them readily separable.

*Prosopis montana*, sp. n.

♀. Stoutly built; head and thorax closely and finely punctured, median segment finely rugose, its base almost striate; abdomen impunctate or nearly so, the first two segments shining; clypeus reaching not much below the lower margin of eyes, its anterior margin rounded; an impressed line from antennal carina to anterior ocellus; three longitudinal carinæ on mesonotum—one median basal, the others sublateral; median segment rounded posteriorly, with a median longitudinal carina at apex. Black; a spot in the centre of clypeus, a lunate spot above it, the latter joining on to marks along the inner orbits, which are broadest medially, and reach as far as the base of antennæ, an interrupted line on the pronotum, the tubercles, tegulæ anteriorly, and all the tibiæ at base, yellow; flagellum of antennæ rufo-testaceous, tarsi inclining to testaceous at apex; median segment, legs, and apex of abdomen with short greyish pubescence; a narrow line of silvery pubescence on each side of first abdominal segment at apex. Wings hyaline, nervures black, tegulæ shining testaceous.

Long. 5 millim.

*Hab.* Mount Abu; not very common.

Near to *P. gujaratica* and *repentens* above, but more stoutly built and different in colouring.

*Prosopis vetusta*, sp. n.

♀. Head and thorax with very fine and shallow punctures, median segment at base somewhat finely rugose; abdomen nearly impunctate, shining; clypeus transverse anteriorly, not reaching below the lower margin of eyes, the front between the bases of antennæ raised, almost tuberculate, with a

median longitudinal line; enclosed space at base of median segment semicircular, enclosed by carinæ, the apical portion of the segment with a median longitudinal carina, on either side of which are transverse striations. Black; the anterior portion of the clypeus, the sides of the front broadly to rather above the base of antennæ, a medially interrupted line on the pronotum, a spot below the base of the wings, the tegulæ anteriorly, the anterior tibiæ above, the base of the intermediate tibiæ, and the basal half of the posterior tibiæ bright yellow; calcaria of posterior tibiæ pale; apical portion of abdomen and the tibiæ and tarsi with stiff greyish pubescence. Wings hyaline; nervures testaceous at base of wings, blackish at apex; tegulæ posteriorly testaceous.

Long. 5.5 millim.

*Hab.* Kashmir; a single specimen obtained between 5000 and 6000 feet.

Nearest to *P. strenua*.

*Prosopis secreta*, sp. n.

♂. Head and thorax finely and somewhat closely punctured, median segment coarsely rugose; abdomen shining, with very fine and shallow punctures; clypeus rounded anteriorly, reaching well below lower margin of eyes, the portion of the front between the bases of antennæ very slightly raised; a somewhat obscure median longitudinal line on the mesonotum and scutellum, median segment with a median carina posteriorly; apical margin of first abdominal segment slightly depressed. Black; the clypeus and front as high as the base of antennæ, a spot on the tegulæ anteriorly, the anterior tibiæ above, a spot at the base of intermediate tibiæ, the basal two fifths of posterior tibiæ, and the basal joint or two joints of intermediate and posterior tarsi, pale yellow; flagellum of antennæ rufescent; abdomen posteriorly and legs with sparse greyish pubescence. Wings hyaline, nervures and tegulæ (except the yellow spot on the latter) black or blackish.

Long. 5 millim.

*Hab.* Kashmir; a single specimen obtained between 5000 and 6000 feet.

This species would come after *P. scutula*.

*Prosopis advocata*, sp. n.

♀. Head and thorax finely and shallowly punctured, median segment coarsely rugose; abdomen shining, impunctate; apex of clypeus reaching slightly below lower margin

of eyes, the front between the bases of antennæ raised, with a slight median groove; a median longitudinal line on mesonotum. Black; a triangular mark along the inner orbits, reaching as high as the base of antennæ, a spot on each lateral angle of the pronotum, the tegulæ anteriorly, a spot below the base of wings, a spot at the base of the anterior and intermediate tibiæ, and about two fifths of the posterior tibiæ at base, pale yellow or yellowish white; flagellum of antennæ sometimes rufescent; the abdomen (especially towards its apex) and the tibiæ and tarsi are covered with short, stiff, greyish hairs. Wings hyaline, nervures black.

Long. 5.5 millim.

*Hab.* Kashmir, 5000–6000 feet; two specimens.

This species comes next to *P. Feai*, but differs from it in the clypeus being black, not yellow. The abdomen is also impunctate, whereas in *P. Feai* it is shallowly punctured.

*Sphecodes sutor*, sp. n.

♀. Head closely and finely punctured, the punctures being slightly wider apart on the clypeus and behind the ocelli than on the vertex and front; mesonotum and scutellum sparsely punctured, postscutellum finely longitudinally rugose, median segment coarsely longitudinally rugose; abdomen impunctate or nearly so; clypeus transverse anteriorly, with a median vertical groove on the apical half and a transverse groove across the centre; thorax truncate anteriorly, the "shoulders" angled, almost dentate; median segment with a well-marked longitudinal carina at apex; first abdominal segment not or scarcely constricted; the whole insect (except the postscutellum, which is opaque) conspicuously shining. Head and thorax black; abdomen red, apical segment blackish; legs black (except the last four or five joints of the tarsi, which are red); a little sparse greyish pubescence, thickest on the front; tibiæ and tarsi with thicker pubescence, which is dark or blackish on the outside, paler inside. Wings fuscous, nervures and tegulæ black.

Long. 10–12 millim.

*Hab.* Kashmir, 5000–6000 feet; very common.

Nearest to *S. apicatus*, from which it can be distinguished by the thorax being sparsely and not closely punctured.

*Sphecodes hanuman*, sp. n.

♀. Head finely and closely, mesonotum and scutellum sparsely punctured; base of median segment longitudinally rugose, its sides very finely striate, the striations curved, apex



of the segment finely rugose ; abdomen with very minute and close punctures, the apices of the segments more or less smooth ; clypeus transverse anteriorly, its sculpturing and that of the front hidden by the pubescence ; pronotum truncate anteriorly, its "shoulders" sharply angled ; segments of the abdomen not constricted. Black ; the abdomen red ; mesonotum and scutellum shining ; pubescence on the front, sides of the thorax, postscutellum, legs, and apical abdominal segments greyish. Wings hyaline, nervures black, tegulæ bronzy testaceous.

Long. 8-9 millim.

*Hab.* Kashmir, 5000-6000 feet ; apparently not common.

Allied to *S. montanus*, but the thorax is sparsely and not coarsely punctured and the abdomen is entirely red.

*Sphecodes abuenensis*, sp. n.

♀. Head and thorax closely and finely, abdomen very minutely and closely punctured ; clypeus transverse anteriorly, its apex reaching well below the lower margin of eyes ; a median impressed line on the basal half of the mesonotum, enclosed space at base of median segment, which is lunate in shape, somewhat finely rugose, the segment truncate posteriorly ; abdominal segments not or scarcely constricted. Black ; the abdomen (except the apical one or two segments) and the apical two or three joints of the tarsi red ; head and thorax more or less covered with snow-white pubescence, thickest on the clypeus and front, where it hides the sculpturing, a little greyish pubescence on apical abdominal segments ; legs covered with somewhat sparse greyish pubescence, which becomes almost fulvous on the inside of the posterior tarsi in some specimens. Wings subhyaline, nervures black, tegulæ testaceous.

♂. Similar, the basal abdominal segment or the greater part of it black ; the pubescence on the legs shorter, the margins of the abdominal segments slightly constricted in most specimens ; the wings clear hyaline, the stigma and most of the nervures testaceous.

Long. 7-11 millim.

*Hab.* Mt. Abu ; very common.

Nearest to *S. montanus*, from which it differs in the head and thorax being finely and not coarsely punctured and in several other respects.

*Sphecodes tantalus*, sp. n.

♀. Head very finely and closely, mesonotum and scutellum equally finely but more sparsely punctured, median segment

with the enclosed space at base almost semicircular, well defined by a marginal carina, and somewhat coarsely longitudinally rugose; sides and apex of median segment finely obliquely striate; abdomen impunctate; clypeus transverse anteriorly, with a median longitudinal depression; the portion of the front between the bases of antennæ raised, a narrow impressed line from it to the anterior ocellus; "shoulders" of pronotum very slightly angled; median segment rounded posteriorly; abdominal segments not constricted. Black; the abdomen red; mesonotum, scutellum, and abdomen shining; clypeus and front, sides of thorax, legs, and apical segments of abdomen sparsely covered with greyish pubescence. Wings hyaline, nervures and tegulæ blackish.

Long. 7-8 millim.

*Hab.* Kashmir, 5000-6000 feet; apparently not common.

Nearest to *S. montanus*, but it is a smaller species, the abdomen is not so dark a red, the punctures on head and thorax are finer, the "shoulders" of the pronotum are much smaller, and the pubescence is more sparse.

*Sphecodes perplexus*, sp. n.

♀. Head finely and closely, mesonotum and scutellum finely and sparsely punctured; median segment with a well-defined, circular, enclosed space at base, which is somewhat coarsely longitudinally rugose; abdomen with punctures only visible with a microscope; clypeus transverse anteriorly, the portion of the front between the bases of antennæ raised, with a narrow carina towards but not quite reaching the anterior ocellus; "shoulders" of pronotum rounded, abdominal segments not constricted. Black; the mandibles (except their tips), tibiæ, tarsi, and abdomen red; antennæ (especially the apical joints) sometimes rufous; pubescence on head, sides of thorax, legs, and apical abdominal segment sparse and whitish. Wings hyaline, nervures blackish, tegulæ red.

Long. 5-6.5 millim.

*Hab.* Kashmir, 5000-6000 feet; common.

This species would come nearest to *S. rubripes*, from which it can be distinguished by the thorax being sparsely punctured and the femora black.

*Sphecodes desertus*, sp. n.

♀. Vertex of head closely and finely, mesonotum and scutellum sparsely and coarsely, abdomen very finely and closely punctured; clypeus transverse anteriorly; median

segment truncate posteriorly, the enclosed space at base (which is not very clearly defined) somewhat coarsely longitudinally rugose; apical margin of first abdominal segment very slightly constricted. Black; the mandibles (except their tips), the antennæ, and the legs (except the apical half of posterior tibiæ) red; mesonotum, scutellum, median segment, and abdomen shining; head, sides of the thorax, and postscutellum covered with thick snow-white pubescence, which hides the sculpturing of the clypeus and front; legs with white, apical abdominal segments with greyish pubescence. Wings clear hyaline, nervures and stigmata testaceous, tegulæ very light testaceous.

♂. Similar; the antennæ darker red, the margins of the abdominal segments more or less constricted and the apical abdominal segment or segments blackish.

Long. 7-8 millim.

*Hab.* Deesa, Mt. Abu; not common.

Having the legs red, this species would come next to *S. rubripes*, from which it would appear to be very distinct.

As regards habits, the species of *Sphecodes* which occur in Kashmir would seem to follow those of their European allies. When I was in Kashmir in May and June I obtained some fifty or sixty specimens of this genus, but there was not a single male among them. I therefore presume that the females hibernate in an impregnated condition and the males do not emerge until the latter part of the summer, as with the British species of the same genus. The females of the species which occur at Deesa and Mount Abu, where there is practically no winter, do not seem to hibernate, so far as I have been able to observe.

### *Halictus magnificus*, sp. n.

♀. Clypeus and vertex finely but not very closely, the front below the ocelli very finely and closely, mesonotum and scutellum sparsely punctured, all the punctures shallow; abdomen impunctate; clypeus very convex and conspicuous, its apex transverse; mesonotum with a median impressed line, median segment short, rounded posteriorly, the enclosed space at base well defined by furrows, and with a median longitudinal indentation or furrow; this space is very finely striate, the striations being longitudinal at base in the centre, transverse at apex, and oblique at the sides, where they are continued over the furrow on to the lateral portion of the segment. Black, the apical two or three joints of the tarsi ferruginous; pubescence on the apex of the clypeus, tibiæ,

and tarsi fulvous or fulvescent, elsewhere greyish; it is sparse on the clypeus and front, and forms apical bands on abdominal segments 1-4; tibial calcaria testaceous, the inner calcar on the posterior legs strongly serrate on the inside. Wings hyaline, with a flavous tinge, slightly darker at apex; nervures and stigma testaceous, tegulæ dark brown.

Long. 15-17 millim.

*Hab.* Kashmir, 5000-6000 feet; frequents thistles.

This does not fit well into any of the sections of Bingham's key. It is, however, much the largest species that has hitherto been recorded from India.

*Halictus resurgens*, sp. n.

♀. Clypeus finely but not very closely, remainder of head and thorax minutely and very closely punctured, abdomen finely aciculate; clypeus much produced, transverse anteriorly; head as wide as thorax; mesonotum with a median longitudinal impressed line; enclosed space at base of median segment large, concave, and minutely rugose, appearing, when viewed in some directions, obliquely striate. Black; the apical two or three joints of the tarsi testaceous, also the calcaria; inner calcar of posterior tibiæ serrate on the inside; pubescence grey, forming apical bands on abdominal segments 1-4 and a slight basal band in the second segment; on the tibiæ, tarsi, and round the anal rima it is fulvescent. Wings hyaline, nervures and stigma testaceous, tegulæ dark testaceous.

Long. 11-12 millim.

*Hab.* Kashmir, 5000-6000 feet; common.

Nearest the previous species, but smaller; the different puncturing of the mesonotum would serve to distinguish them at once.

*Andrena patella*, sp. n.

♀. Clypeus closely and finely, remainder of head more minutely, abdomen minutely but not very distinctly punctured, the sculpturing of the thorax hidden by the pubescence; clypeus transverse anteriorly, with a median longitudinal carina, front with a carina from anterior ocellus which does not reach the carina on the clypeus. Black; intermediate and posterior tarsi rufo-testaceous, tibial calcaria pale; pubescence dense, on head, thorax, legs, and first two abdominal segments pale fulvous, palest on the latter; on the remainder of abdomen it is black, on the fifth segment mixed



with fulvous and griseous hairs. Wings flavo-hyaline, slightly paler at apex ; nervures and tegulæ dark testaceous to black.

Long. 13-14 millim.

*Hab.* Kashmir, 6000-7000 feet ; two specimens.

I am unable to place this species in Bingham's key, which is most unsuitable for working out this genus, owing to the pubescence seldom allowing the sculpturing of the base of the median segment to be properly seen. It is, however, easily distinguished by its flavo-hyaline wings.

*Nomada decorata* (Smith).

The description does not give the sculpturing, which is as follows :—

♀. Head and thorax finely, abdomen much more minutely punctured ; the basal portion of enclosed space at base of median segment finely longitudinally striate, apical portion punctured.

The male has not, I believe, been previously described.

♂. Similar to the female, except that there is no large yellow macula on median segment, the basal portions of abdominal segments are black instead of ferruginous (in some specimens the apical portions are also black), and the legs, though they vary somewhat in different specimens, are generally darker.

The pubescence in both sexes is whitish and sparse, except on the clypeus, front, and sides of the median segment, where it is somewhat dense.

*Nomada beata*, sp. n.

♀. Head and thorax finely and rugosely punctured, with a granular appearance ; abdomen smooth ; clypeus sub-parallel, its apex transverse ; a short carina between bases of antennæ ; pronotum very short, depressed in the centre ; scutellum with its lateral margins much raised, almost tuberculate ; median segment with a large triangular area at base smooth and a median longitudinal impressed line. Red ; the junctions of the segments of the thorax and the base of the first abdominal segment black ; large irregular sublateral spots on second and third and a median band on third and fourth abdominal segments yellow ; all the yellow markings somewhat ill-defined and obscure ; clypeus, legs, and apical abdominal segment with short, sparse, golden pubescence.

Wings flavo-hyaline, a lighter patch beyond third cubital cell; nervures testaceous, tegulæ red and finely punctured, stigma pale testaceous.

Long. 11–13 millim.

*Hab.* Kashmir, 5000–6000 feet.

*Nomada radiata*, sp. n.

♀. Differs from *N. beata* only as follows:—Smaller, the enclosed space at base of median segment finely rugosely punctured; the spots on the abdomen are smaller: wings fusco-hyaline, with no flavous tinge; nervures black or blackish, not pale testaceous.

♂. Similar; wings paler, almost hyaline; abdomen lighter red; head and thorax with greyish pubescence, which is longest and thickest on the clypeus and front; scape and first three joints of flagellum black above.

Long., ♀ 6–10, ♂ 7–8 millim.

*Hab.* Kashmir, 5000–6000 feet; common.

This species, especially the female, varies a great deal in size. A variety has the yellow markings entirely obsolete.

*Nomada arida*, sp. n.

♀. In sculpturing scarcely differs from *N. beata*. Colour as follows:—Black; the mandibles, labrum, apex of clypeus, antennæ, and legs red; a line along the inner orbits as high as the base of antennæ, the pronotum, tegulæ, a spot below the latter, two spots on the scutellum, a transverse band (medially interrupted) on second and third abdominal segments, the base of the fourth segment, the apex of the fifth segment, and subapical bands on ventral segments 2–4, yellow; pubescence on head and thorax greyish, on apical abdominal segments greyish mixed with fuscous, on legs golden; wings flavo-hyaline, nervures and stigma testaceous.

♂. Similar; scape of antennæ below yellow, above black; the yellow bands on second and third abdominal segments interrupted; coxæ, trochanters, and femora more or less marked with black. The yellow band on basal abdominal segment is frequently almost obsolete.

Long. 10–13 millim.

*Hab.* Kashmir; common between 5000 and 9000 feet.

This is a variable species, and the yellow markings are in many specimens more or less replaced by red.

As the Indian species of *Nomada* do not differ to any great extent in sculpturing and are variable both in size

and colouring, they are very difficult to separate. I have therefore made out the following key to assist in their identification:—

- A. Median segment marked with yellow ..... *N. decorata*, ♀.  
 B. Median segment not marked with yellow.  
   *a*. Head and thorax chiefly red.  
     *a*<sup>1</sup>. Abdomen with second and following segments black and yellow ..... *N. priscilla*.  
     *b*<sup>1</sup>. Abdomen with second and following segments red, or red and yellow.  
       *a*<sup>2</sup>. Length over 10 millim. .... *N. beata*.  
       *b*<sup>2</sup>. Length under 10 millim.  
         *a*<sup>3</sup>. Whole abdomen smooth, impunctate.  
           *a*<sup>4</sup>. Enclosed space at base of median segment striate ..... *N. lusca*.  
           *b*<sup>4</sup>. Enclosed space finely rugosely punctured. .... *N. radiata*, ♀.  
         *b*<sup>3</sup>. Bases of second and following segments punctured. .... *N. adusta*.  
     *a*<sup>1</sup>. Abdomen with second and following segments red, with black and yellow markings. *N. flavozonata*, ♀.  
*b*. Head and thorax chiefly black.  
   *a*<sup>1</sup>. Second and following abdominal segments red, with yellow markings.  
     *a*<sup>2</sup>. Head and thorax with red markings.... *N. radiata*, ♂.  
     *b*<sup>2</sup>. Head and thorax with yellow markings.. *N. decorata*, ♂.  
   *b*<sup>1</sup>. Second and following abdominal segments black, with yellow, or red and yellow, markings.  
     *a*<sup>2</sup>. Legs more or less yellow.  
       *a*<sup>3</sup>. Abdomen finely punctured ..... *N. flavozonata*, ♂.  
       *b*<sup>3</sup>. Abdomen impunctate ..... *N. solitaria*.  
     *b*<sup>2</sup>. Legs red, or red and black.  
       *a*<sup>3</sup>. Scutellum with two large yellow maculæ ..... *N. arida*.  
       *b*<sup>3</sup>. Scutellum immaculate.  
         *a*<sup>4</sup>. Front with golden pubescence..... *N. lucilla*.  
         *b*<sup>4</sup>. Front with long fuscous hairs..... *N. ceylonica*.

*Osmia gulmargensis*, sp. n.

♀. Head and thorax very finely and closely, abdomen closely and still more minutely punctured; clypeus rounded anteriorly, large and convex; abdomen scarcely longer than thorax, the segments very slightly constricted at apex. Head, thorax, and legs dark green, shining; flagellum of antennæ black; abdomen lighter metallic green; tibial calcaria and apical joints of tarsi rufous; head, thorax, basal segment of abdomen, and legs as far as the apex of the tibiæ with greyish pubescence, longest on the thorax; remainder of abdomen, the tarsi, and scopa with light red or reddish-golden pubescence, especially thick on the inside of tarsi.

Wings subhyaline, nervures black; tegulæ dark greenish black, shining.

Long. 12 millim.

*Hab.* Kashmir, near Gulmarg, between 8000 and 9000 feet; a single example.

*Osmia kashmirensis*, sp. n.

♂. Head, thorax, and abdomen finely and closely punctured, the punctures on the abdomen being shallowest. Metallic green; antennæ black or blackish; apical joints of tarsi more or less rufous; pubescence light reddish grey, longest on the front and thorax, where it more or less hides the sculpturing; tibial calcaria black or blackish. Wings hyaline, nervures and tegulæ black.

Long. 6-7 millim.

*Hab.* Kashmir; a few specimens obtained between 6000 and 9000 feet.

I obtained this species on one occasion coming out of what was apparently its nest in a hole in the stump of a tree. In general appearance it is not unlike *O. gulmargensis*, but I do not think that it can be the male of that species, as it is only about half its size. The colour of the pubescence is also quite different, and the tibial calcaria in the present species are black or nearly so, whereas those of *O. gulmargensis* are rufous.

*Megachile nadia*, sp. n.

♀. Closely resembles the same sex of *M. coeliowsides* (Bingh.), but may be distinguished by the lateral hairs of abdominal segments when viewed from above being black, and not white. In some specimens the white pubescence has a somewhat flavous tinge.

♂. Differs from the same sex of *M. coeliowsides* in having the pubescence pale fulvous, becoming almost golden on the clypeus and front.

Long. 7-9 millim.

*Hab.* Murree-Kashmir road, between 4000 and 5000 feet.

I bred about a dozen specimens from nests made in an old nest of *Eumenes dimidiatipennis*, which I obtained on my way from Kashmir.

*Megachile appia*, sp. n.

♂. Head, thorax, and abdomen closely and finely, but somewhat shallowly punctured; abdominal segments much



constricted, apical segment notched, but without teeth. Black; tibial claws rufous at base, calcaria testaceous; pubescence greyish, inclining to fulvous on the front and to rufous on the inside of the tarsi; on the head it is long and thick, on the thorax and first abdominal segment it is long and rather sparse, and on the remainder of the abdomen it is short, forming thin, frequently interrupted bands on the margins of the segments; on the posterior tibiæ and tarsi it is short and somewhat sparse. Wings subhyaline, nervures and tegulæ black.

Long. 10 millim.

*Hab.* Kashmir, 5000–6000 feet.

Nearest to *M. katinka* (Nurse), but it is a larger and more stoutly built insect.

*Anthidium conciliatum*, sp. n.

♀. Head and thorax closely and somewhat coarsely punctured, granular; abdomen much more finely punctured, the bases of segments more sparsely so than the apices; clypeus transverse anteriorly, with an irregular, median, longitudinal carina; median segment with a median, longitudinal, impressed line at base; scutellum lunate, deeply notched posteriorly; the lateral margins of abdominal segments 5 and 6 produced into teeth; intermediate tibiæ with a short tooth above and a similar but smaller one on anterior tibiæ. Black; a large spot on each side of the clypeus, another on each side of the front below the base of antennæ, a small spot on the vertex behind each eye, and elongate lateral spots on abdominal segments 1–6 yellow; the spots wide apart on first segment, but becoming gradually nearer and broader on each of the other segments successively; all the tibiæ with yellow spots at base, the tarsi tending to testaceous, the anterior tarsi yellowish white above, calcaria testaceous, tarsal claws unidentate, the tooth long and acute; pubescence white, dusky grey on head and thorax above, where it is sparse, on the inside of tibiæ and tarsi it is almost fulvous; scopa white. Wings hyaline at base, subfuscous at apex; nervures and tegulæ blackish.

Long. 10 millim.

*Hab.* Kashmir; one specimen obtained on the path leading from Baramoola to Gulmarg, between 6000 and 8000 feet.

This species would come into Bingham's key under a new subsection—"b. *U*. *b*<sup>2</sup>. *c*<sup>3</sup>. Head variegated with yellow, thorax immaculate,"—in which would also come *A. desidiosum* (Bingh.). The latter is, however, easily distinguishable

from the present species by its yellow tibiæ and tarsi. I may mention that the locality given for *A. desidiosum*, described by Lieut.-Col. Bingham from a specimen obtained by me, should be Simla, not Deesa. I obtained a second specimen in 1901 from between 6000 and 8000 feet in Kashmir.

*Cælixys stolidus*, sp. n.

♂. Head and thorax densely punctured, granular; abdomen finely but not very regularly punctured; clypeus and front in the type specimen with the sculpturing hidden by pubescence; scutellum short, rounded posteriorly, with large lateral teeth; abdomen with all the segments more or less constricted, fourth and fifth segments with minute median longitudinal carinæ at their bases, apical segment with a median groove dividing its apical margin, which is curved upwards; below this, and projecting slightly beyond it, there are two very blunt teeth, the space between them being less than their width; there are also two lateral teeth below, near the base of the segment. Black; clypeus and front with thick pale golden pubescence; cheeks, sides of thorax, two minute spots at the base of the scutellum, the sides of the abdomen, and the legs with snow-white, inside of tarsi with fulvous pubescence; tibial calcaria testaceous. Wings hyaline, slightly infuscated at apex, nervures and tegulæ black.

Long. 10 millim.

*Hab.* Deesa; a single specimen.

Nearest to *C. cuneatus*, from which it may be distinguished by having no lateral tooth on fifth ventral segment.

*Crocisa kashmirensis*, sp. n.

♀. Clypeus minutely, head and thorax finely and closely but not very regularly punctured; abdomen finely aciculate; clypeus porrect, its apical margin transverse; scutellum with its apical margin deeply emarginate, its lateral angles produced into two teeth. Black; the pubescence on head and thorax long and greyish, with a few black hairs, thickest on front, where it obscures the sculpturing; abdomen with spots of snow-white pubescence on the lateral margins of segments 1-4, those on the third and fourth segments being less far apart than those on segments 1 and 2; a little black pubescence at apex of abdomen; legs with black pubescence, all the tibiæ having a large spot of snow-white pubescence at base above; tibial calcaria black, the inner calcar of posterior

tibiæ very long. Wings subfuscous; nervures and tegulæ black, the latter large.

Long. 12 millim.

*Hab.* Kashmir, 5000–6000 feet; fairly common.

Not very near to any Indian species.

*Tetralonia brevipennis* (Cam.).

I obtained a number of both sexes of this species from Deesa and Abu; and as Mr. Cameron's description was evidently taken from a single specimen, I will add a few remarks to it. The pubescence on the thorax of a fresh specimen is rich fulvous in the female, slightly paler in the male. The shortness of the wings is not always so marked as in the specimen figured by Mr. Cameron. In the male the wings do not appear remarkably short; the antennæ are rufous below, and vary from rufous to black above. The nervures vary from pale to dark testaceous in both sexes.

At Deesa I never found this species except during September; from Abu I obtained it in July and August. As might be expected, the specimens show some seasonal dimorphism, the Abu specimens obtained during the rainy season being much darker than those collected at Deesa during the cold weather.

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LXXVI.—*Notes from the Gatty Marine Laboratory, St. Andrews.*—No. XXIV. By Prof. M'INTOSH, M.D., LL.D., F.R.S., &c.

1. On the Frequency of the Occurrence of Pearls in the Mussel (*Mytilus edulis*), &c.
2. The Effects of Marine Piscatorial Birds on the Food-Fishes.
3. On the British *Eunicidæ*.

1. *On the Frequency of the Occurrence of Pearls in the Mussel* (*Mytilus edulis*), &c.

The frequency of the occurrence of pearls in the various marine and freshwater shells is fixed by no law. Hundreds of pearl-shells may be examined without finding a single pearl, but, on the other hand, a single Ceylonese shell will occasionally produce a pearl worth a large sum. An experienced pearl-fisherman of the Tay considered that perhaps one in a hundred contained a marketable pearl. In a group of 31 examined lately by Mr. Alex. J. H. Russell, M.A.,

15 had no pearls and 16 had one or more, so that nearly 50 per cent. in this instance had pearls of a kind, for they were of no value. Of these, 8 contained only one pearl, four had two, two had four of different sizes. These, however, came from a well-known curve of the Tay which has always been rich in pearls, and where otters and ducks abound. Dr. Lyster Jameson is of opinion that otters, for instance, might be the final hosts, as, like the raccoon, mink, and musk-rat of North America, it is stated they occasionally eat mussels. The next collection of mussels, which exceeded the former in number, did not contain one pearl. In former years, when hundreds were examined on the banks of the Tay at Murthly, the same irregularity prevailed, many having none, whilst others contained one or more.

In order to test the frequency of their occurrence in the common mussel of the estuary of the Eden, Mr. Russell examined 700 for me. Of this number 620 were large mussels and 80 small—some very small. Of the 620 large mussels, pearls were found in 280—that is to say, 340 had no pearls; and of the 80 small mussels, 20 had pearls and 60 were devoid of them. In dealing with the pearl-bearing forms, both large and small, and which thus number 300, the following table gives the precise number of pearls in each series, as well as the totals :—

No. of Pearls....	1	2	3	4	5	6	7	8 or more pearls.	Totals.
Large Mussels ..	136	67	31	15	7	14	3	7	280
Small Mussels ..	12	..	5	..	1	..	..	2 (12 pearls)	20
Totals , .....	148	67	36	15	8	14	3	9	300

The proportion of the 300 pearl-bearing mussels to the total number (700) is thus 42·8 per cent.; but if the large mussels alone are considered, the proportion is higher, viz. 45·1 per cent., which indicates that the common mussel more or less follows the same law as the pearl-oyster, viz., that the older forms produce most pearls. Indeed, the number of pearls in the very small mussels at St. Andrews is noteworthy, and may be explained by the fact that the very small are not necessarily young mussels, as a glance at the crowded masses of minute forms on the rocks show.



As formerly pointed out by Dr. J. H. Wilson and myself, though stunted they are ripe; it may be that the same explanation will suffice for the pearls, which occurred in 25 per cent. of them. It will thus be evident that pearls appear in the common mussel much more frequently than in the pearl-oyster, or, as a rule, in the freshwater pearl-mussel (*Margaritana margaritifera*), but generally their lack of lustre and beauty makes them of little value.

In connexion with Dr. Lyster Jameson's views that the eider duck and the scoter are the final hosts of the parasites which form the nuclei of the pearls, it may be stated that both occur in considerable numbers in the estuary of the Eden and feed on the mussels. Moreover, the intestine of the common scoter in St. Andrews Bay harbours large numbers of these and other parasites, and thus is in contrast with that of such forms as the guillemot and red-throated diver—birds more purely piscivorous, and in which such parasites are rare, though cestodes are common. It is possible also that other species amongst the many birds frequenting the mussel-beds, such as the oyster-catcher, may be found to harbour the same parasite.

Respecting Sir E. Home's statement that the ova of the mussel form the nuclei of the pearls in the mantle, it has to be mentioned that pearls are found in the males, where no ova occur.

## 2. *The Effects of Marine Piscatorial Birds on the Food-Fishes.*

It is often supposed that man in these days stands out pre-eminently as the great destroyer of sea-fishes—by his nets, trawls, and other apparatus; but, as shown in the 'Resources of the Sea' and in former "Notes," there are other agencies which exist, and have existed for ages, which, in their persistent influences on the young stages or on the adults of the fishes, place the efforts of man in a less prominent position. This reflection has been suggested by the captures of sea-birds in the nets for plaice and cod in St. Andrews Bay. These nets have been worked for more than two years—at any rate for two seasons, viz. from the middle of September to the middle of May, that is for 8 months each year. The majority of the birds captured have been guillemots (*Uria troile*, L.), but divers, common and velvet scoters, scaup-ducks, and razorbills are also procured, the latter more rarely. Neither gulls nor gannets have been obtained. Taking an average of 25 birds as a

total captured by the boats at St. Andrews in a day for this period, and calculating 5 working days in a week, it is found that the total for the season will be about 4000 birds. This is probably a low average, for lately no less than 620 birds were brought in by the boats in one day, whilst on other occasions 100 and 200 birds were procured in a single day.

Selecting another low average, viz. 30, as the number of fishes captured by each bird in a day, it is found that, in the 224 days which cover the fishing-period, these birds would have disposed of 26,880,000 fishes each season; and yet this is but a fragment of the vast tax levied on fishes—especially young fishes—by the sea-birds in St. Andrews Bay. That 30 fishes a day is a very moderate computation a little experience will prove. Thus 30 small sand-eels have been found in the stomach of a single guillemot as the amount consumed within a few hours. In the same way 10 sprats, between two and three inches long, and several sand-eels formed the meal of another, whilst the gizzard contained a quantity of crushed fragments and many otoliths. The digestive activity of this bird keeps pace with its rapacity. Those who have watched a guillemot at work in the open sea capturing young fishes right and left at the surface, or have seen a cormorant amidst a swarm of young fishes in a tank \*, will consider that the foregoing estimate is not overstated, even taking into account the fact that the scoters and scaup-ducks feed largely on Mollusca. Both, however, devour young fishes and the floating eggs of fishes in thousands as they are carried by currents in long lines near the surface.

While, therefore, man's agency—in conjunction with natural causes, leading occasionally to a check in the increase of fishes—need not be underestimated, it is doubtful if due appreciation is accorded to the vast variety and great extent of natural agencies which tend, on the one hand, to check increase, and, on the other, to restore the balance which has been impaired. In contrast with these, man's efforts, great though they may be, are overshadowed. Nature's ways in the ocean, especially in regard to the food-fishes, are not easily interfered with; and though apparent reduction in the larger forms may occur in certain areas, yet myriads of the smaller soon occupy their places and restore the supremacy of the larger.

The loss of 4000 piscatorial birds in a season in one bay

\* As, for example, in the Dublin Zoological Gardens under the auspices of Prof. Cunningham.

ought to have, according to some, a marked effect on the plenitude of the fishes. Yet there can be little doubt that such trifling changes have no more influence on Nature's ways than the removal of many of the right whales had on the pelagic fauna on which they fed in the arctic seas. Greater reason for concern would exist if the swarms of sea-birds were to die from inanition, if the slaughter of thousands of sea-birds improved the fishes of an area, or if their increase were marked by a diminution of the sea-fishes.

### 3. On the British Eunicidæ.

There is much to be said in favour of the view of Ehlers, who groups, in the second part of his 'Borstenwürmer'\*, the Onuphididæ, the Lumbriconereidæ, and the Staurocephalidæ under the Eunicidæ. Of the three, the latter is the most widely divergent, since it has bifid feet and other features in general structure and in the form of the bristles which call for special note. Each of the groups just mentioned constitutes a distinct division, yet they have many features in common, and fall fairly under Ehlers's two great sections of the *Eunicea Labidognatha* and *E. Prionognatha*. The former contains those forms in which the pieces composing the upper dental apparatus are heterogeneous; the maxillæ and the great dental plates have in front a series of smaller pieces. The feet are simple, though the presence of slender spines which pass into the dorsal cirrus indicates that even here the bifid foot is foreshadowed. The bristles are of three kinds, viz., simple bristles with a tapering winged tip accompanied by shorter brush-shaped forms superiorly, and, in most species, compound bristles inferiorly, the latter having the terminal piece bifid at the tip and guarded by wings, and, moreover, posteriorly, a powerful hook or two project inferiorly. In the Onuphids, however, a modification of this type occurs.

As Ehlers has pointed out, this group (*E. Labidognatha*) may readily be divided into two subdivisions: the first, including the Onuphididæ, Eunicidæ, and other allied forms, is characterized by the presence of an azygos piece below the great dental plate on the left, whilst the head bears tentacles. The second division has its dental apparatus symmetrical and the head is devoid of tentacles: the Lumbriconereidæ and *Ninoe* fall under this section.

The *Eunicea Prionognatha*, forming the second great

\* 1868.

division, are characterized by having the dentary plates of the upper jaw-apparatus placed in rows one behind the other, and, moreover, the pieces resemble each other. The feet may be either single or double. Two groups likewise occur in this division, viz.: (1) those in which the feet are simple, as likewise are the bristles, such as *Arabella*, *Noto-cirrus*, and *Ænone*; and (2) those with feet having both simple and compound bristles, such as *Staurocephalus*.

Grube\*, again, takes Ehlers's first group, *Labidognatha*, but prefers the term *Lumbriconereida*, Schmarda, for the second, dividing it further into (1) those with leaf-like dorsal cirri, such as *Ænone* and *Lysareta*, and (2) those with small dorsal cirri, e. g. *Ninoe* and *Lumbriconereis*. He agrees in making the *Staurocephalidæ* the third group.

In Dr. Johnston's† Catalogue of the Annelids in the British Museum, two members of the Onuphidæ, viz. "*Northia tubicola*" and *N. conchylega*, are entered. The former (*Hyalinæcia tubicola*, O. F. M.) is free from ambiguity, but the latter title probably covers two species, viz., the original *Onuphis tubicola* of M. Sars, and another form which may provisionally be termed *O. britannica*. Of Eunicidæ seven are noted: but it is questionable if one of these, viz. *Eunice annulicornis*, is British; whilst another, *E. margaritacea*, cannot be identified from the imperfect figure‡ of Dr. Thos. Williams. A single Lumbriconereid, viz. *Lumbrinereis tricolor*, is mentioned—a species which falls under the genus *Arabella*.

A few other forms have been added since by Miss Florence Buchanan and others, such as *Eunice philocorallia*, *Nematonereis unicornis*, Schm., *Lumbriconereis gracilis*, Ehlers, and *Ophyrotrocha*. The *Staurocephalidæ* likewise increase the list by two or three species.

As indicated in the remarks on the group in the volume on the Annelids of the 'Challenger,' considerable variation occurs in most of the organs relied on by authors for specific discrimination, such as the dental apparatus, the branchiæ, the general outline, appendages, and coloration. The bristles also show a certain amount of variation, but, on the whole, are fairly reliable, though it should be stated that the distinctions between species in this respect, as, for instance,

\* Sitz. d. nat. Schles. Gesell. 1878, Sep. Abd. pp. 2 & 3.

† Quite recently the last survivor of this amiable naturalist's family, viz. a daughter, Mrs. Barwell Carter, passed away. She was well known in Berwick-on-Tweed for her efforts to promote Natural History and the interests of the Berwickshire Naturalists' Club.

‡ Ann. & Mag. Nat. Hist. ser. 2, xii. p. 408, pl. xiv. fig. 4.



observed in the Polynoidæ, are less marked. Unfortunately not a few authors rely on verbal descriptions without figures, and occasionally the latter are somewhat imperfect, so that the expenditure of time in vainly endeavouring to grasp the author's meaning is serious.

In the present preliminary note five species represent the Onuphids in the British seas, and all frequent water of some depth. The first of these is a form which probably has been included under the *Onuphis conchylega* of Michael Sars, but which is quite distinct, and may be termed *Onuphis britannica*. It frequents the Zetlandic seas in 90 to 100 fathoms. The tentacular cirri arise from the centre of the peristomial segment dorsally. The first pair of feet on the succeeding segment are large, and project forwards almost as far as the anterior border of the snout, and bear, besides the simple bristles, large falcate bristles with bifid tips and wings, the whole differing characteristically from those of the true *Onuphis conchylega*, Sars. The dental apparatus, again, resembles that of the latter species, though the teeth on the various plates appear to be more numerous. The branchiæ commence on the 10th foot as a simple filament and continue almost to the tip of the tail. The powerful bifid hooks of the posterior region and the brush-shaped bristles are similar to those of *Onuphis conchylega*. This form constructs a tube of its secretion and fragments of shells.

The other form, *Onuphis conchylega*, Sars, occurs not only in Norwegian waters, but off the eastern shores of Britain, and in vast numbers in the Atlantic, as dredged by H.M. ship 'Triton'\*, as well as stretches to the shores of Canada. In this form the somewhat short tentacular cirri are borne by the anterior border of the peristomial segment. The general form of the dental apparatus is the same, though the number of denticulations is less. The posterior appendages to the maxillæ are tapered to a point posteriorly, and have a notch between them, a T-shaped band of pigment separating them from each other and from the maxillæ.

The first foot is shorter; the long, strong, falcate bristles have a very bold hook at the tip and a small secondary process a short distance beneath, and with wings. The character of this hook differs from that of *Onuphis britannica*, not only in the completely developed condition, but in its early stage when nothing but the tip is formed. In many adults, however, the secondary process either disappears or

\* I am indebted to Sir John Murray for these and other specimens procured by this ship.

leaves only a trace, the powerful blunt hook at the tip alone remaining. The large bifid hook of the inferior part of the setigerous region posteriorly conforms to the type seen in the previous species.

In this form a trace of a branchia sometimes appears on the 11th foot, but as a rule branchiæ commence on the 12th foot, and are continued backward, as in the former annelid, almost to the tip of the tail. They form single filaments throughout, and only rarely is an accessory process developed. On the whole they are considerably smaller processes than in the former species.

Whilst occasionally the tube is formed of fragments of shells, it is often entirely composed of coarse gravel and minute stones. This species is probably the *Onuphis hyperborea* of Hansen \*.

In the third form, *Onuphis* (*Paradiopatra*) *fragosa*, Ehlers (?) †, var., which was dredged by the 'Porcupine' in 1869 in 370 fathoms off the coast of Ireland in sticky mud, the median is shorter than the two long lateral tentacles, and the short anterior lateral have finely tapered tips. All have long ringed ceratophores. The palpi form prominent rounded lobes ventrally. The first (peristomial) segment has less breadth than the succeeding, and the short tentacular cirri arise laterally at the anterior border. The maxillæ are strongly curved and sharp in front, and their spathulate posterior appendages have a notch between them. The right great dental plate has nine teeth, and the same number occurs in the left, as well as in the azygos plate. The left anterior curved plate has seven or eight, and the right about nine teeth. The mandibles are small, the edge in front consisting of two small central points with a dark brown band between them and the external flap with its oblique edge.

The first foot is short and directed slightly forward. The setigerous region has dorsally simple tapering bristles with no evident wing. The ventral forms have tips minutely bifid, so minutely that it is not always easy to observe the real structure in such transparent forms. The wings, moreover, are long and tapered to a fine point.

The feet diminish in prominence from the 1st to the 5th, and still more thereafter. The dorsal cirrus after the 7th is very small. No branchial process has been observed, in this respect agreeing with *Nothria abbranchiala* of the 'Chal-

\* Norweg. N. Atlantic Exp. 1882, p. 32, pl. iv. figs. 5-13.

† Florida Anneliden, p. 75, Taf. xx. figs. 7-14, and Taf. xxi. figs. 1-4.

lenger.' The slenderness of the tips of the bristles of the first foot in the British form is, however, diagnostic.

The simple dorsal bristles with winged tapering tips are short in the 10th foot, but become longer in the 20th and posterior feet, and in the latter are accompanied by two strong bifid hooks inferiorly.

This form approaches *Nothria Willemoesi* of the 'Challenger,' yet is distinct in regard to comparative lengths of the median and lateral tentacles and in the minute structure of the anterior bristles, which come nearer those of *N. Armandi* and *N. minuta*. It appears to be closely allied to the *Diopatra* (*Paradiopatra*) *fragosa* of Ehlers\*, taken off Sand Key and other parts of the American shores, though the minute structure of the bristles, the breadth of the peristomial segment, the position of the tentacular cirri, and other points require further investigation. The *Onuphis quadricuspis* of Sars has similar bristles on the first foot, but otherwise diverges, *e.g.* in the presence of branchiæ.

Those in the second group of the Onuphiidæ are devoid of tentacular cirri, though it has to be mentioned, as demonstrating the caution necessary in dealing with such characters, that, in an example of *Hyalinæcia tubicola* from Norway (Canon Norman's collection), a well-formed tentacular cirrus, arising from the middle of the peristomial segment, occurred.

The most abundant and widely distributed species is *Hyalinæcia tubicola*, O. F. Müller, and it is specially plentiful in Zetlandic and Hebridean waters and off the south-west coast of Ireland. The strongly bifid winged falcate bristles of the first foot and the powerful bifid hooks behind are diagnostic. The branchiæ commence from the 23rd to the 26th foot and continue almost to the last segment.

The translucent quill-like tube is easily recognized.

Another is *Hyalinæcia sicula*, De Quatrefages, a small species which ranges from Shetland, where it was first dredged by Dr. Gwyn Jeffreys, to Connemara on the west and Plymouth on the south. Two parallel bands of brown which course backwards from a transverse belt of the same colour immediately behind the head, and a brown spot between each foot from the 5th backward, readily distinguish the species even in spirit. Its tube is generally composed of gravel and shell-fragments.

Of the Eunicids, the *Eunice fasciata* of Risso (= *E. Harrassii* of Audouin and Edwards) is not unfrequent in the

\* Christianiafjordens Fauna, p. 16, tab. xv. figs. 7-19.

Channel Islands, both in the dredge and between tide-marks. Its numerous olive-brown bands and touches, white specks, and size (6 to 9 inches) make it readily recognizable. The occurrence of the branchiæ on the 4th bristled segment, the fact that their maximum development is in the anterior third of the body, and that, gradually diminishing, they are represented in the caudal region by a single filament as in front, are also features of moment, along with the structure of the bristles and hooks. The powerful ventral hooks appear before the 30th bristled segment and continue to the posterior end.

As formerly pointed out, another British species is *Eunice vittata*, Delle Chiaje (= *E. limosa*, Ehlers), which occurs on various parts of the British coast from the Channel Islands to Polperro and Galway. It is a small species (2 to 3 inches in length) with an evenly rounded snout composed of the fused palpi, which, however, show a deep ventral furrow. The branchiæ commence on the 3rd foot as a simple filament; on the 10th foot are four divisions; on the 30th five divisions. They then diminish so that the 40th foot has only four, the 50th two, and the 60th one. They are absent only on the caudal segments (17 or 18). The falcate bristles and the bifid crown above the great fang of the posterior hooks and the dental apparatus are likewise characteristic.

The third British species is *Eunice pennata*, O. F. M.\* (= *E. norvegica*, L.), dredged off Inverary by Dr. Gwyn Jeffreys. In this the fused palpi have a deep notch in front and a deep groove ventrally, whilst superiorly they are excavated. The branchiæ commence as a short subulate process on the 4th foot; three divisions occur on the 8th foot. The 12th foot has only two; those following generally two, though occasionally three. Then diminishing to one, they cease about the 40th foot. The highest number of branchial filaments observed was four. The spines are black in the adult. The ventral bristles have a short bifid terminal piece considerably narrower than the dilated end of the shaft. The powerful posterior hooks have a main fang and a strong spike above it. The great dental plates have seven teeth, the azygos (left) plate has nine. The left anterior curved plate has six and the right ten teeth, and the row is continued by two separate brown denticles in each case. Marenzeller has found this form in the

\* Zool. Dan. i. p. 31, tab. xxix. figs. 4-7.



Mediterranean \*. It is distinct from the *E. philocorallia* of F. Buchanan.

The fourth is *Eunice philocorallia* (or *coralliophila*), F. Buchanan †, which was dredged in deep water off the west coast of Ireland, and which ranges to Norway. In a female from Norway the branchiæ commenced on the 7th foot and continued almost to the tip of the tail, and the same arrangement was found in a male. The divisions of the branchiæ do not exceed four, and generally there were three anteriorly. The head resembles that of *Eunice pennata*, with a hollow on the dorsum of the palpi. Behind the anterior third the spines are black. The relationship of this form to the *Eunice amphihelie* of Marion and Roule ‡ is interesting, both having their parchment-like tubes on corals (*Amphihelia* and *Lophohelia*) in deep water. The French form is eyeless and thus differs from the British; the branchiæ commence on the 2nd foot (fourth segment), whilst in the British they arise on the 7th foot, and have never more than four filaments, whereas the French has a maximum of seven filaments. The dental apparatus also shows certain features in common and certain differences. How far the variations mentioned affect specific distinction is still a question open to consideration. Some may be sexual. Roule, in a later communication §, includes his *Eunice amphihelie*, the *E. philocorallia* of F. Buchanan, and the *E. floridana* of Ehlers all under the *Eunice Gunneri* of Storm, the two species, indeed, found in the north by Levinsen || being *Leodice norvegica*, L., and *L. Gunneri*, Storm. Marenzeller ¶ has similar views.

The representatives of the allied genus *Marphysa* are two in number, viz., *Marphysa sanguinea*, Montagu, and *Marphysa Bellii*, Aud. & Edwards.

The former is abundant in the Channel Islands, *e. g.* at St. Peter Port, Perelle Bay, in Herm, and in the Gouliot Caves of Sark. It also occurs in the south of England, *e. g.* Polperro. The flattened and deeply bilobed head with the typical number of tentacles, the absence of the tentacular

\* Polychæt. des Grundes, Wien, 1902, p. 16.

† Sc. Proceed. R. Dubl. Soc., June 13, 1893, p. 173, pl. i. figs. 2-6, pl. ii. figs. 7-9, and pl. iii.

‡ Campagne du 'Caudan,' p. 446, pls. xix., xx., xxiii., and xxv. (1896).

§ Compt. Rend. Acad. Sci. tom. cxxvi. p. 1167.

|| Syst.-geogr. Oversigt, Annulata &c., Kiöbenhavn, 1883, p. 72.

¶ Zoolog. Ergebnisse XIII., Denkschr. k. Ak. Wiss., Math.-nat. Cl., Wien, 1902, p. 16.

cirri, the long (18 inches to 2 feet) body, which is somewhat rounded in extension, flattened in contraction, the condition of the dental apparatus, and the ventral bristles, the terminal part of which is long and tapered, are sufficiently characteristic. The branchiæ commence about the 21st foot, attain a maximum of eight divisions, then diminish, until in front of the tail a short process of two divisions and then of one occurs, the last twelve or fifteen segments being devoid of them. The spines are black.

*Marphysa Bellii*, Aud. & Ed., again, is rather a rare British form, the only living example observed having been captured in Herm. It is attenuated for a *Eunice* and is 6 or 7 inches long. The head is bluntly conical, with a median groove inferiorly, and the tentacles are proportionally long. The branchiæ commence on the 14th foot and continue to the 34th, and the maximum number of filaments appears to be about twenty-five. The number of teeth on the great dental plates is about six, whilst the azygos plate has seven. The living example was obtained between tide-marks, but in the 'Porcupine' Expedition of 1870 it was dredged in 81 fathoms off Cape Finisterre.

A species very abundant in the Channel Islands and in the south of England is *Lysidice ninetta*, Aud. & Edwards (the *Leodice triantennata* of Risso). It is especially common in the chinks of gneiss in the Channel Islands. Its broad flattened snout with a median notch, the short tentacles (a median and two lateral), and the reddish-brown body dappled with white or pale spots readily distinguish it externally.

In the same region (Guernsey) is *Nematonereis unicornis*, Grube \*, which frequents similar fissures in gneiss between tide-marks. The evenly rounded snout forming a short blunt cone, the two black eyes with the short subulate median tentacles between them, the form and coloration of the body, the nature of the foot and its bristles, and the structure of the dental apparatus are diagnostic. This form diverges from Schmarda's species—procured in the Atlantic—in the smooth subulate tentacle, the form of the maxillæ, and in the shorter tips to the compound bristles.

Under the *Eunicea Labidognatha nuda* of Ehlers is *Lumbriconereis fragilis*, O. F. Müller, a form which is widely distributed in British waters from Shetland to the Channel Islands. In this the conical head has a dimple posteriorly leading into two pits with papillæ. The foot has simple

\* Actin., Echin. und Würmer des Adriat. u. Mittelmeers, p. 80 (1840).

winged bristles as far as the 24th, when winged hooks appear. The spines are black. The tapering winged bristles disappear before the 60th foot, the posterior feet having only the winged hooks and black spines. The feet increase in length posteriorly, and the posterior lobe becomes pointed. The body ends in four short papillæ (cirri), the dorsal pair being the longer.

Another species also common in the south is *Lumbriconereis Nardonis*, Grube, the head of which forms a blunt cone with a band in the centre posteriorly attached to the succeeding segment, and at each side of the band is a dimple which receives a process from the first segment. The 1st foot has pale spines, a short bluntly conical posterior flap, winged tapering bristles superiorly and inferiorly, and a few winged jointed hooks, the ends of which have four or five spines. Simple winged hooks by-and-by take the place of the jointed bristles.

There is a close resemblance between this species and such forms as the *Lumbriconereis oxychæta* of C. Gravier\*.

A third form (*Lumbriconereis assimilis*) was dredged by Dr. Gwyn Jeffreys 25 miles off North Unst, Shetland, in 90 fathoms, in July 1868, and it also occurred in the muddy tubes of *Panthalis Cæstedii* kindly sent by Prof. Herdman from the Irish Sea. The head forms a blunt cone and the dental apparatus is similar to that of *L. fragilis*. The 1st foot is distinguished by the occurrence of long, narrow, winged hooks and of black spines. The winged hooks become modified, so that at the 20th foot they are considerably shorter. Posteriorly the chief fang of the hook becomes much larger, the wing shorter, and the shaft stronger as well as shorter.

A fourth was dredged in 90 fathoms, 25 miles west of the Blasquet, S.W. Ireland, by Dr. Gwyn Jeffreys, in May 1867. In this (*Lumbriconereis hibernica*) the head is conical, and the 1st foot has three or four pale spines and two groups of tapering winged bristles. The 10th foot has four pale spines and dorsally winged tapering bristles, whilst ventrally are characteristically tapered simple hooks, which in the posterior part of the body become very short, with broad wings.

The fifth British form is *Lumbriconereis gracilis*, Ehlers, a widely distributed species ranging from the western shores of Scotland and Ireland to the Mediterranean and to Norway. The head is also conical and the dental apparatus approaches that of *L. tingens*. The 1st foot has tapering winged

\* Nouv. Arch. Mus. Paris, 4<sup>e</sup> sér. ii. p. 275, pl. xiv. figs. 96-98.

bristles dorsally and, ventrally, jointed hooks which have a short terminal piece—with a crown of small hooks and two wings, the adjacent end of the shaft likewise having two wings. There are four pale spines. These jointed hooks continue to the 15th foot and then disappear, their places being taken by simple winged hooks.

Of the *Eunicea Prionognatha* of Ehlers several British species occur. The first is provisionally termed *Drilonereis Elisabethæ*, which was procured at St. Andrews in the stomach of a haddock by the lady after whom it is named. It is recognized by the finer and more persistent iridescence, and the bluntly conical head with four eyes in a transverse line at the posterior border, besides the structural features. The black abruptly hooked maxillæ are powerful, with a broad base—denticulated on the inner edge—articulating posteriorly with very long black appendages. Great dental plates elongate, black, and nearly rhomboidal, with about six to eight recurved teeth along the inner edge, the first being considerably larger than the others. Antero-lateral plates three, small, each with a single, long, sharp fang, the first or proximal showing in addition a second short tooth at the base of the chief fang. The mandibles form dark brown wedge-shaped plates. The broad anterior edge is slightly roughened, but it is not calcified. A typical foot has a small dorsal lobe sloping outward and upward, a short setigerous lobe, with four or five ordinary spines, a large stout spine with a slightly tapered tip below the others, and a broadly lanceolate inferior lobe directed upward. Bristles simple, winged, tapering, with oblique striæ on the wings.

While in the general outline of the body, the shape of the head, and the arrangement of the eyes this form approaches *Arabella iricolor*, Mont., it diverges in the structure of the foot and also of the dental apparatus, especially in the comparatively great size of the maxillæ and the diminution of the three antero-lateral plates. The large size of the maxillæ, again, distinguishes it from *Notocirrus* (char. amend.), to which it is allied in the presence of the great inferior spines. It seems to approach most nearly to *Drilonereis*, Claparède \*, though the eyes are borne by the peristomial segment in the species described by that author and De St. Joseph †, and, if the figures are to be trusted, the antero-lateral teeth of the dental apparatus are considerably larger.

\* Ann. Chétop. Nap., Suppl.

† Ann. Sc. Nat. 7<sup>e</sup> sér., Zool. v. pp. 224 *et seq.*



Another species is the well-known *Arabella iricolor* of Montagu \* = *A. tricolor* (Leach) Johnston, (probably the *Arabella quadristriata* of Grube), which abounds between tide-marks in the Channel Islands and also occurs in the south of England and on the west coast of Ireland. The head is somewhat flattened, bluntly conical, an eye being on each side of the middle line posteriorly and slightly in front of the other, which is external on each side and less conspicuous. Maxillæ short, broad posteriorly, strongly curved, with massive bases serrated internally, which are articulated with two tapering processes, the narrow ends being joined to two long parallel blackish rods which gradually diminish posteriorly and end in slight enlargements. The great dental plate has nine or ten teeth. The pair of plates immediately anterior have five powerful teeth, the most conspicuous being the first. The next in front has four teeth, the anterior tooth being the largest. The most anterior consists of a single long curved hook or tooth, the base of which posteriorly touches the next plate. The mandibles form long blackish wedges, with oblique anterior edges, the outer part of which is translucent, hard, and brittle. Though slight variations occur in the figures of Ehlers and De St. Joseph representing the dental apparatus, yet they show apparently identical structure. The figure of Ehlers †, again, needs amendment, *e. g.* in regard to the maxillæ. The foot has a small dorsal lobe above the setigerous process and a large lower lobe. At the 10th foot the row of bristles passes from above downward and forward, below the upper and in front of the posterior lobe. This continues to the tail, where the line of bristles is less oblique and the setigerous lobe more prominent. The bristles are of two kinds: (1) a dorsal series gently curved and with long finely tapered tips and narrow wings, and (2) a series with shorter tips presenting a more abrupt curve at the end of the shaft, the free edge of the curve having about five serrations. Anteriorly the setigerous region has from five to seven spines, and by-and-by the dorsal region has a group (four or five) of small spines which pass to the base of the cirrus. Posteriorly the dorsal group increases in size. So far as can at present be ascertained, this species seems to agree with *Maclovina gigantea*, Grube, as figured and described by Baron de St. Joseph ‡.

\* Linn. Trans. vii. p. 82 (1802).

† Zeitsch. f. w. Zool. Bd. xxv. Taf. iii. fig. 33.

‡ Ann. Sc. Nat. 7<sup>e</sup> sér. v. p. 230, pl. ix. figs. 92-95.

In a note on the synonymy of this species Dr. Willey\* appears to think that because the "so-called" *Notocirrus tricolor* was mentioned in the 'Challenger' volume, it was so in continuation of the mistaken identity (by Prof. Ehlers) of this form with the author's *Notocirrus scoticus*. That is a misapprehension. The species were described as distinct.

The relationship of this form to Delle Chiaje's† *Lumbricus Saint-Hilarii* appears to be close. It is noteworthy that the four rows of spots were not evident in the specimens from the Channel Islands, so that variation may exist.

Though Schmarda's description‡ of *Notocirrus* as applied to Lumbriconereids with a dorsal process may be open to doubt, yet the title may be conserved for the type for which it was used in 1869, not long after the publication of Schmarda's work, viz. *Notocirrus scoticus*, M'I. §, which requires generic separation from allied forms. The genus is characterized by the conical head, with a pair of eyes placed quite at the posterior border. The body is slender, long, tough, and almost moniliform in outline. The feet are short, with a small conical dorsal process (branchial in function). The setigerous region bears simple bristles with short tapering tips and broad wings which are serrated on the edge, and one or two powerful spines with simple slightly tapered tips. The dental apparatus has small, toothed, and modified maxillæ posteriorly, and in front a series of three other dental plates with recurved hooks. The mandibles are irregularly wedge-shaped.

The third species is *Notocirrus scoticus*, M'I., first procured in the tenacious grey mud of Lochmaddy, and subsequently in various parts of the Hebridean seas. Its conical head has two eyes at the posterior border; the body is about 3 inches in length, firm, and frequently almost moniliform. The typical foot has a small dorsal lobe, in which is a single vascular loop. The setigerous region is supported by two strong spines, and the brittle bristles have comparatively short, broadly winged tips, boldly serrated at the edges.

In his account of the Annelids of the 'Challenger' dredged at a greater depth than 500 fathoms ||, Ehlers considers that this form is identical with the *Notocirrus tricolor* of Johnston; but this is a misapprehension, since the two forms are widely

\* Journ. Mar. Biol. Assoc., N. S. vi. p. 98 (July 1900).

† Claparède, Ann. Chét. Nap. p. 150, pl. ix. fig. 4.

‡ Wirb. Thiere, i., ii., p. 116 (1861).

§ Trans. R. S. E. vol. xxv. p. 417, pl. xvi. fig. 17.

|| Zeitsch. f. w. Zool. xxv. p. 55.

different. Dr. Johnston's species is *Arabella iricolor*, Mont., whereas the present is a *Notocirrus*, the structure of head, foot, and bristles all diverging.

Another very active small form was procured under a stone in a tide-pool at Herm, but unfortunately it has been lost. The head was smoothly rounded in front and of a brighter reddish orange than the rest of the body, which was dark orange with the dorsal blood-vessel shining through. The segments were very minutely dotted as if punctured. The tail had two longer and two shorter cirri.

LXXVII.—On the Occurrence of *Acomys* in Cyprus.

By DOROTHY M. A. BATE.

WHILE in Cyprus in 1902 I procured a number of specimens of a spiny mouse, a genus which had not previously been recorded from this island. On comparing it with the species in the collection of the British Museum, it proves to differ from all these, and apparently belongs to a hitherto undescribed form, which I therefore propose to name

*Acomys nesiotes*, sp. n.

Size and general appearance as in *A. dimidiatus*, but at once distinguishable by its very much shorter tail, which in the mature animal measures considerably less than the head and body, while the reverse usually obtains in *A. dimidiatus*.

The Cypriote mouse is represented by a series of thirteen specimens—six, caught in May, June, and July, being very young; one, caught in October, is full-grown, though still retaining its immature coloration; and the remaining six are fully adult. In no. 156, which is taken as the type of the species, the whole of the underparts and the upper surfaces of the hands and feet are pure white, and there is a patch of light hair at the external base of the ear-conch. The flanks are "wood-brown"\* and the back a mixture of "wood-brown" and grey, the latter more predominant than in *A. dimidiatus*. The speckled appearance of the greater part of the dorsal region is due to the colour of the hairs and spines, which are pale grey or almost colourless for the greater part of their length, and tipped with dark grey or

\* Colours given in inverted commas are taken from 'A Nomenclature of Colours,' by Robert Ridgway (Boston, 1886).

"wood-brown," which also continues for a short distance along the edges of their distal ends. Intermixed with and projecting beyond these are a few long fine hairs. The spines, which extend over the hinder half of the back, resemble those of *A. dimidiatus* in being cylindrical at the base, then suddenly expanding they become laminate and taper to a point. Seen in section the edges are found to be folded downwards and inwards; thus the ventral aspect of the spine is deeply grooved, whilst the upper surface is very slightly rounded. The roots of the spines appear as a dark patch on the inner surface of the skin, which elsewhere is very white. The tail, which is thicker for its length than that of the above-mentioned species, is pale below, "mouse-grey" on the upperside, scantily covered with short stiff hairs, and has a terminal tuft of finer ones.

The skull is slightly more robust than that of *A. dimidiatus*, its greatest length being 32.5 to 33 millim. and its extreme width 14 millim.

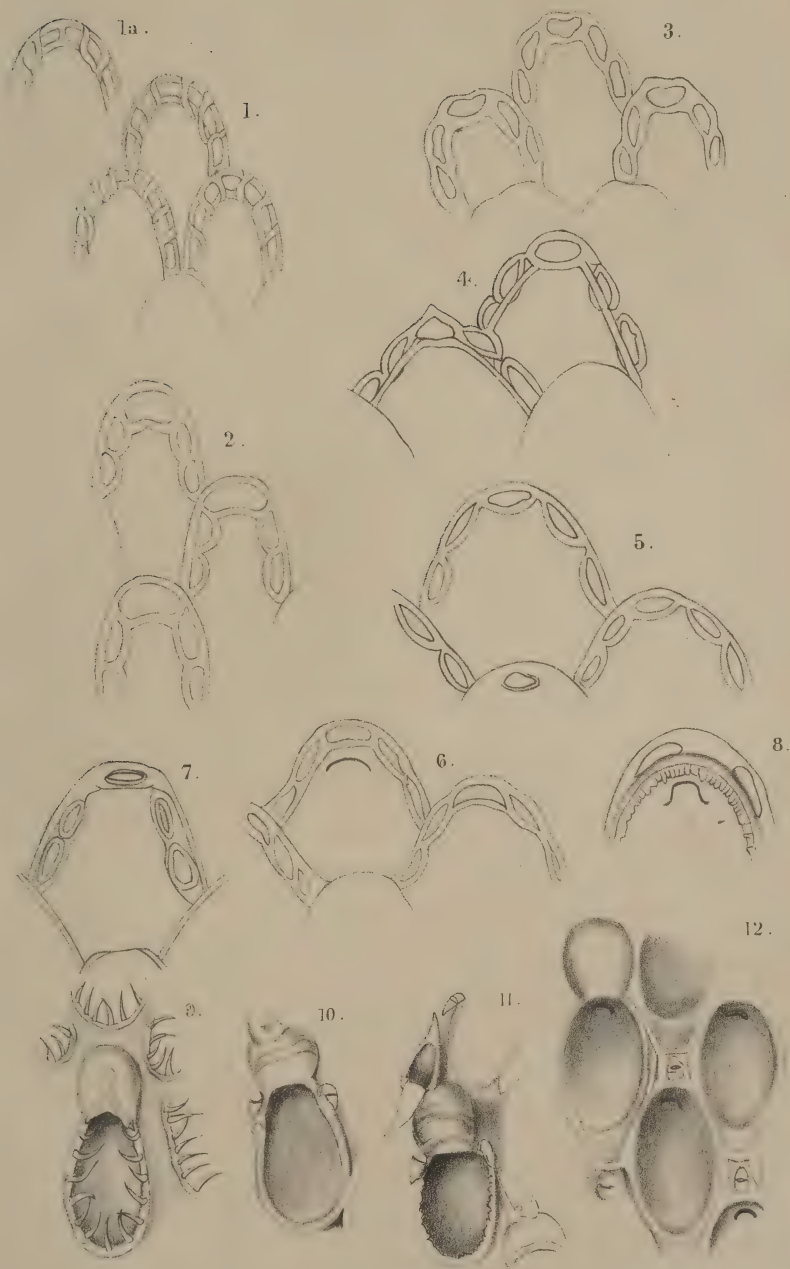
The following measurements, in millimetres, of the adult specimens were taken in the flesh:—

	Head and body.	Tail.	Hind foot.	Ear.
No. 153 (♀) .....	130	93	22	20
No. 155 (♀) .....	111	72	20	21
No. 156 (♂, type) ..	119	71	18	19
No. 158 (♂) .....	109	..	19	19.5
No. 159 (♂) .....	110	..	19	20
No. 160 (♀) .....	106	..	20	19

The young differ from the adult in their upper parts being entirely "mouse-grey," with the exception of white hands and feet, and in their tails being comparatively longer. The young of *A. dimidiatus* seem to develop the speckled appearance of the mature animal much earlier than those of *A. nesiotus*; a half-grown specimen of the former in the collection of the British Museum is already changing colour, while a full-grown young of the Cypriote form is still an almost uniform "mouse-grey" above, shading off into "drab-grey" on the flanks.

As in other members of this group—*A. cahirinus*, for instance,—the tail is exceedingly brittle, it, or its skin, becoming detached on very slight provocation, though less easily in the case of the young. This also happens when the mouse is in a wild state, for several tail-less specimens were brought to me which had evidently lost this appendage some time previously. No doubt this peculiarity, as in the







case of the lizard, must be of use to the rodent when pursued by shepherds' dogs, birds of prey, or other enemies, though, unlike the lizard, it is unable to repeat the manœuvre.

These mice were caught alive in traps baited with bread by villagers, who said they were very scarce, though there appeared to be no difficulty in getting as many as I required. They also told me that their holes are very deep and that they are never found in houses, though said to haunt the "mandras" (caves and shelters for goats) in the hills.

They were all caught in the Kerynia Hills, not far from the village of Dikomo. This portion of the south side of the range, which is composed of a grey limestone, is extremely barren, strewn with stones fallen from the rocks and cliffs, and sparsely clothed with low and generally thorny plants. The undulating ground and plain lying below are for the greater part of the year arid and practically destitute of vegetation. Remains of this mouse were found in the earth of a cave in the same locality. I never met with or heard of it in other parts of the island, though probably it occurs at any rate over the whole of the Mesoreoa, or central plain, and the southern slopes of the Kerynia Hills.

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LXXVIII.—*Notes on the Natural History of East Finmark.*

By Canon A. M. NORMAN, M.A., D.C.L., LL.D., F.R.S., F.L.S.

[Continued from p. 173.]

[Plate XIII.]

POLYZOA.

I HAVE in the following paper on Polyzoa extended the scope of the subject beyond the limit of East Finmarkian species, in order to introduce matter relating to classification and observations on some Arctic and other species. The species which have been found in East Finmark have been numbered, and such species as have no prefixed number will be understood not to have connexion with the fauna of that district.

Herr F. A. Smitt, in 1865-74, published his 'Kritisk Förteckning öfver Skandinaviens Hafs-bryzoer.' This work contained an admirable series of illustrations of Scandinavian and Arctic Polyzoa. The figures, though small, were excellent, and they have been and must continue to be

of great value to the student. Smitt was highly conservative with respect to nomenclature, in so far that he adopted existing genera, enlarging or altogether altering their characters so that they might embrace the species with which he was dealing. Indeed, he formed only one new genus—*Anarthropora*—among the Cheilostomata. Moreover, he instituted very few new species, distributing most of the interesting new varieties which he found, as well as many previously described species, under existing names, not calling these freshly acquired Polyzoa varieties, but "*formæ*."

Now it is not far from the truth to say that in the opinion of recent writers these "*formæ*," with few exceptions, are regarded as entitled to specific rank. This is, however, of course, a mere matter of opinion, and his work remains a most valuable contribution to our knowledge of the Polyzoa. He was, moreover, the pioneer who maintained that among the Escharine and Lepralian groups the form which the zoarium assumes is of little value as affording generic or specific characters in comparison with the structure of the individual zoecia which make up the zoarium, and in the application of this principle he took his characters from the several features of the zoecium and its appendages. Soon after the publication of his work, through the kindness of Prof. Lovén and Herr Smitt I received in exchange from the Stockholm Museum a very full series of the Polyzoa which were described in the latter's monograph; and these specimens have been of very great value in enabling me to positively determine certain forms.

Smitt, in the work referred to and in his "*Bryozoa marina in regionibus arcticis et borealibus viventia*," *Öfvers. k. Vet.-Akad. Förh.* (1867) 1868, p. 443, recorded eighty species and "*formæ*" from Finmark, but there is no means of knowing in what part of Finmark they had been found.

While Danielssen supplies one or two East Finmark species, our previous knowledge of the Polyzoa of the district is due to papers by Herr O. Nordgaard; one of these is "*Norwegian North Atlantic Expedition, Polyzoa*," 1900, and the others "*Systematisk fortegnelse over de i Norge hidtil observerede arter af marine Polyzoa, I. Cheilostomata*," *Bergens Mus. Aarbog*, 1895, and "*II. Cyclostomata*," *ibid.* 1896.

The '*History of British Marine Polyzoa*' is a work of the greatest value and importance on the species of our fauna. It is unfortunate that some of the genera which Mr. Hincks founded mainly on the form of the oral opening were so loosely characterized that they admitted forms which have



really little in common. His work, moreover, contained a most serious mistake. He acted in it as though there were no such things as rules of nomenclature, casting aside many old genera as though they never existed and misapplying others. The primary law of nomenclature, which alone can save zoology from hopeless confusion, is that "The name originally given by the founder of a group or the describer of a species should be permanently retained, to the exclusion of all subsequent synonyms." The mistake of Hincks in this matter and the injustice caused to previous writers must sooner or later be rectified. It is to be regretted that this has not been done long since. Verrill has made some corrections, and further delay will only render the necessary changes when made the more serious, as it would allow of the addition of further useless synonyms. I know of no other class in which the law I have referred to has been so ruthlessly set aside. Was it that Hincks was ignorant of all law? or was it that as the characters given to the old genera were totally inadequate from the modern point of view, he considered that they might be disregarded? The answer is that two items remain permanent, unless they be synonyms of earlier described forms—the name of a genus and the name of a species. The definition of a genus or species must of necessity be continually changing with increasing knowledge of the forms themselves and of others more recently discovered which are allied to them. If it were otherwise, could some of Hincks's own genera—say *Schizoporella*, *Smittia*, or *Mucronella*—be at this moment maintained with the definition which he gave to them? The following are instances in which the law of priority was disregarded among the Cheilostomata.

*Chorizopora Brongniartii*.—The generic name is that of Hincks, the specific of Audouin. Both must yield to *Berenicea prominens*, Lamouroux (Expos. méthod. des Genres de l'Ord. des Polyp. 1821, p. 80, pl. lxxx. figs. 1, 2). The type of Lamouroux's species was from the Mediterranean, and it unquestionably was drawn from the netted state of the species (see Hincks, Brit. Pol. pl. xxxii. fig. 2). There is an earlier genus among Medusæ—*Berenice*, Péron & Lesueur, 1809—but the two generic names are sufficiently distinct.

*Schizoporella*, Hincks, ought to have been named *Escharina*, H. Milne-Edwards, since it included *E. vulgaris* (Moll) (see Lamarck and Gray). But I have always considered that *E. vulgaris* was wrongly placed by Hincks in his genus, and that its keyhole-like oral opening and the avicularia situated so low down on the zoœcia, with their vibraculoid

character, pointed to much closer relationship to what Hincks called *Mastigophora*. Recently Levinsen ('Studies on Bryozoa,' 1902, p. 26) has intimated his intention of removing some other "*Schizoporella*" into the same genus.

*Mastigophora*, Hincks.—This genus ought not to have been instituted unless the genus *Herentia*, Gray, had been used for some other form, since the first species which Gray placed in the genus was *Herentia Hyndmanni*, the very species which Hincks made the type of his *Mastigophora*. But, as intimated in the preceding paragraph, *Escharina*, H. Milne-Edwards, must apparently take precedence of both these names.

*Lepralia*, Hincks.—This has no connexion whatever with *Lepralia*, Johnston. It does not contain a single species which Johnston had placed within it when the genus was formed! Moreover, an extraordinary liberty has been taken here. *Eschara foliacea*, the type species of the oldest genus of Cheilostomata except *Cellepora*, is actually submerged in the *Lepralia* of Hincks and the genus slaughtered.

*Umbonula*, Hincks.—The type *U. verrucosa*, Esper; but this same species is the type of the old genus *Discopora*, Lamarck (see Lamarck and Lamouroux, the latter author deciding the type).

*Escharoides* of Smitt and Hincks is not *Escharoides*, Lamarck, the type of which is *Cellepora coccinea*, Abildgaard (see Lamarck and Gray, who determine the species intended by their references to Fleming and Johnston).

*Mucronella*, Hincks.—If some doubt existed as to the species which was described by the name *Cellepora coccinea*, it certainly was either what is now known as *coccinea* or *ventricosa*, Johnston, both of which species were included in the *Mucronella* of Hincks, which therefore ought to have borne the name *Escharoides*, H. Milne-Edwards; but if *M. coccinea* is now placed in a different genus from *M. ventricosa*, as must, I think, be the case, Gray's genus *Escharella*, 1848, should be used for the *ventricosa* group. Gray placed in his genus three species—*immersa*, Fleming (= *Peachii*, Johnston), *violacea*, Johnston, and *variolosa*, Johnston,—the first and third of which would remain in it. *Escharella*, Gray, 1848, is not the subsequently described *Escharella*, d'Orbigny, 1850, nor *Escharella*, Smitt, 1867.

Since the publication of the 'History of British Marine Polyzoa' most valuable work has been carried out by many students on the structure—using the word in its widest sense—of the Escharine Polyzoa. But I shall refer here only

briefly to points which afford the chief assistance in the classification of the forms.

### 1. *The Compensation-Sac.*

The compensation-sac was first observed by Jullien, and has been lately worked out fully by S. F. Harmer, "On the Structure and Classification of Cheilostomous Polyzoa" (Proc. Cambridge Phil. Soc. vol. xi. 1900, p. 11). The importance of the compensation-sac is so great that it ranks in classification as dividing the order Cheilostomata into two sections, the one provided with and the other not possessing the compensation-sac. The genera which possess a compensation-sac, and which embrace the greater portion of the Escharine and Lepralian forms, Levinsen ("Studies on Bryozoa," Vidensk. Medd. fra den Naturh. Fören. i Kjöbenhavn, 1902, p. 2, separate copy) proposes to unite under the term *Camarostega*.

### 2. *The Front Wall.*

Jullien rightly called attention to the importance of taking into consideration the structure of the front wall in the classification.

### 3. *The Operculum.*

Waters, as long ago as 1878, in his paper "The Use of the Opercula in the determination of the Cheilostomatous Bryozoa" (Proc. Manchester Lit. & Phil. Soc. vol. xviii. p. 8), pointed out that the form of the operculum was more reliable in classification than the outline of the oral aperture, since the latter is subject to great modification, while the former is stable. Since that time the operculum has been much studied by Waters, Lorenz, Levinsen, and others. There cannot be a doubt that it is of great value in classification as regards, first, its nature (membranous or calcareous, separable or inseparable); second, its form and structure; and third, the mode of its attachment in the oral opening and the muscular scars which it exhibits.

### 4. *The so-called 'Rosette-plates' (or 'Origelles' of Jullien) and Pore-chambers.*

These have been chiefly studied by Waters, Jullien, and Levinsen. They are destined to play a very important part in classification. The rosette-plates have been studied for a

long time, but the observations on the pore-chambers are of more recent date. It is Levinsen who has played the chief part in their examination, and he has published figures of those of many species: first in 'Videnskab-Udbytte Kanonbaden "Haughs" Togter,' 1891, pls. ii. & iii., and subsequently in 'Zoologica Danica, Mosdyr,' 1894, pls. iii.-vi. Waters, in some of his more recent papers, and more especially in his "Observations on the Membraniporidae," Journ. Linn. Soc., Zool. vol. xxvi. 1898, p. 654, has described and illustrated pore-chambers of certain species. I have, in the following paper, made much use of them in dividing the old genus *Membranipora*, as well as in other cases.

### 5. *The Avicularia.*

Hincks made some use of the avicularia and vibracula in the establishment of certain genera, and they have been, of course, used constantly in specific characters; but these organs deserve far more attention than they have hitherto received. Their structure and their position in the zoarium or zoecium would seem to constitute often most reliable aid in assigning the forms to what we designate species or genera among the Polyzoa, just as the presence or absence and the forms and position of pedicellariæ have been found of very great importance in the classification of Echinoderma. The foregoing sentence was written some months ago, and in writing it I had more especially in my mind the Asteroidea. I have now (March 1903) just received the beautiful work of Th. Mortensen on the Echinoidea ('The Danish Ingolf Expedition,' vol. iv.—I. Echinoidea, pt. i. 1903). The following sentences are from his work, and are worthy of consideration in connexion with the value of the avicularia of the Polyzoa:—

"The characters which have hitherto chiefly been used for the distinguishing between the genera and species are the following: the pores, the spines, the tubercles, the mouth-slits, the lining of the buccal membrane with larger or smaller plates, and the calycinal area. All these structures may give excellent characters, and, of course, they are always to be taken into consideration. But most frequently they are so relative, that it is exceedingly difficult or impossible, by means of these structures, to decide whether a specimen in hand belongs to one species or another... By these researches the pedicellariæ and spicules proved to be of very great systematic value; they give the most excellent characters we may want... *The pedicellariæ in effect give absolutely excellent systematic characters*, sometimes only specific



characters, sometimes also generic ones. . . It may, perhaps, seem unreasonable to lay so much stress, as is done here, on so minute features as the pedicellariæ—to use them for the characterizing of as well species as genera and families. But when it proves to be a real fact that these minute features give excellent constant characters, it may be taken to be reasonable to use them without regard to their being small or large . . . The supposition by Stewart that by the examination of the pedicellariæ &c. we might find a closer relation between forms not otherwise regarded as related, has been amply justified by these researches, even to so high a degree that the classification hitherto used proves to be quite a failure (with regards to the groups treated of here). A good proof of the correctness of the new classification given here, which has been found especially by the examination of the pedicellariæ, is found in the fact that forms with the same kind of pedicellariæ also agree in other important respects.”

The avicularia have been little used in the classification of Polyzoa, but I am satisfied that they are destined to play a far more prominent part in the future. In some genera Hincks made use of them with good results; in others he disregarded them altogether and left genera (e. g. *Membranipora*, *Schizoporella*, *Mucronella*, and *Lepralia*) to contain a most miscellaneous assemblage of species. Busk, in his ‘Challenger’ Report, used them with satisfactory result, especially as applied to the very difficult genus *Cellepora*. But the following sentences from the paper by Waters, “Observations on the Membraniporidae” (Journ. Linn. Soc., Zool. vol. xxvi. 1898, pp. 655–657) relate to a more minute point among his “Membraniporidae.” He says: “the avicularium only exceptionally has a complete bar.” Then writing of an aberrant group (the genus *Chaperia*, Jullien) he says: “Kirkpatrick refers *Chaperia acanthina*, Q. & G., to *Lepralia*, but in *Chaperia* the avicularia have not a complete bar; whereas in all the *Lepraliæ* I have examined the bar is complete, and the muscular attachment of *Lepralia* is not quite similar.” I have confirmed Waters’s statement as to the incomplete bar in the avicularia of *Membranipora* in the following species: *flustroides*, *lineata*, *craticula*, *aurita*, *Dumerillii*, *unicornis*, *armifera*, *Sophiæ*, *nigrans*, *tenuirostris*, *granulifera*, *trifolium*, and *Flemingii*. But the bar is incomplete also in other genera, e. g. *Lepralia nitida*, *Reptadeonella violacea*, *Cribilina punctata*, *innominata*, and *radiata*, and *Mucronella* (?) *pavonella*; while it is complete in *Cribilina figularis*, *Chorizopora Brongniartii*, *Microporella ciliata*, *Schizoporella unicornis*, *linearis*, and other species of the genus, *Smittia trispinosa*,

*reticulata*, and many of their allies which I have examined. The absence of the complete bar seems therefore to be nearly general among the Membraniporidæ, but to occur also in some other instances. The interest of this question lies in affording evidence that not only the presence or absence of avicularia, or their general form when present, is worthy of consideration, but even such minute points in regard to the building up of the avicularium itself as this little slender bar.

But the bar is not always incomplete among what have been called Membraniporidæ. It would seem that in cases when the oval or oblong avicularium occupies a distinct chamber apart from the zoecium the bar is complete; this is the case in *Oochilina crassimarginata* and *tensa* and *Lernacicus corniger*.

### Class POLYZOA.

#### Subclass I. ENTOPROCTA.

##### Genus LOXOSOMA, Keferstein.

#### 1. *Loxosoma phascolosomatum*, C. Vogt.

Bög Fiord on *Phascolion*.

##### Genus PEDICELLINA, M. Sars.

#### 2. *Pedicellina cernua* (Pallas).

Var. *belgica*, J. van Beneden, = var. *glabra*, Hincks.

The smooth-stemmed variety of *P. cernua* was taken between tide-marks at Vadsö.

#### Subclass II. ECTOPROCTA.

##### Order GYMNOLÆMATA.

#### Suborder I. CYCLOSTOMATA.

##### Genus CRISIA, Lamouroux.

#### 3. *Crisia denticulata* (Lamarek).

Varanger Fiord down to 150 fathoms; and also in Bög and Lang Fiords; and it was dredged by the Norwegian North Atlantic Expedition off Vardö in 148 fathoms.

#### 4. *Crisia eburnea* (Linné).

Between tide-marks at Vadsö.

Genus STOMATOPORA, Bronn.

5. *Stomatopora fungia* (Couch).

Sværholt (*Nordgaard*).

Genus IDMONEA, Lamouroux.

6. *Idmonea atlantica*, E. Forbes.

Vardö ; Vadsö ; Lang and Bög Fiords ; also at Svolvær.

7. *Idmonea serpens* (Linné).

Vadsö (*Danielssen*)\*.

Genus DIASTOPORA, Lamouroux.

8. *Diastopora obelia*, Johnston.

On Hydroids from Vardö fishing-boats.

Genus HORNERA, Lamouroux.

9. *Hornera lichenoides* (Linné).

Bög Fiord, in 120 fathoms (*A. M. N.*) ; Vadsö (*Danielssen*).

Genus LICHENOPORA, Defrance.

10. *Lichenopora hispida* (Fleming).

Vadsö, at entrance of harbour ; and Nordgaard records it from Sværholt.

11. *Lichenopora verrucaria*, Fabricius.

Sværholt (*Nordgaard*).

Genus DEFRANCIA, Bronn.

12. *Defrancia lucernaria*, M. Sars.

1851. *Tubulipora lucernaria*, M. Sars, "Beretning om en i Sommeren 1849 foretagen zoologisk Reise i Lofoten og Finmark," *Nyt Mag. Naturvid.* vol. vi. p. 25 (separate copy).

1856. *Defrancia truncata*, Busk, *Ann. & Mag. Nat. Hist.* ser. 2, vol. xviii. p. 35, pl. i. figs. 8 a, b (non *Millepora truncata*, Jameson).

1862. *Defrancia lucernaria*, M. Sars, "Beskrivelse over nogle norske Polyzoer," *Vidensk.-Selskab. Förhand.* p. 26 (separate copy).

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\* Danielssen, 'Beretning om zoologisk Reise foretagen i Sommeren 1857,' Christiania, 1859.

1875. *Defrancia lucernaria*, Busk, Cat. Marine Polyzoa, Brit. Mus. pt. iii. Cyclostomata, p. 36, pl. xxxiii. fig. 3.

1900. *Defrancia lucernaria*, Nordgaard, Norwegian N. Atlantic Exped. pt. xxvii. Polyzoa, p. 20, pl. i. figs. 16, 17.

Vadsö (*M. Sars*); Porsanger Fiord, 'Voringen' (*Nordgaard*). I have also found this species at Florö in West Norway.

## Suborder II. CTENOSTOMATA.

### Genus *ALCYONIDIUM*, Lamouroux.

#### \*13. *Alcyonidium hirsutum* (Fleming).

1866. *Alcyonidium papillosum*, Smitt, "Kritisk Förteckning, &c." pt. ii., Öfvers. Kongl. Vet.-Akad. Förhand. pp. 499, 516, pl. xii. figs. 20, 21.

As has been pointed out by Hincks, the *A. hirsutum* of Smitt is not this species but *A. mamillatum*, Alder, and *A. lineare*, Hincks.

I did not take this species in East Finmark, but found the encrusting form on *Fucus* at Svolvær, Lofoten Islands.

#### 14. *Alcyonidium gelatinosum* (Linné).

Taken by the Norwegian North Atlantic Expedition in the Porsanger Fiord.

### Genus *FLUSTRELLA*, Gray.

#### \*15. *Flustrella hispida* (Fabricius).

Svolvær, Lofoten Islands.

#### 16. *Flustrella corniculata* (Smitt).

1871. *Alcyonidium corniculatum*, Smitt, "Kritisk Förteckning, &c." pt. v., Öfvers. Kongl. Vet.-Akad. Förhand. p. 1123, pl. xx. figs. 10-16.

The clusters of zoëcia of this species were found wrapped round the stems of *Gemellaria loricata* living between tide-marks at Vadsö. It has previously been found at Spitsbergen and in the sea to the north of Norway; but not on the Norwegian coast.

### Genus *CYLINDRÆCIUM*, Hincks.

#### 17. *Cylindræcium dilatatum*, Hincks.

1856. *Avenella fusca*, Busk, Quart. Journ. Micr. Sci. vol. iv. p. 94, pl. iii. fig. 6 (but not *A. fusca*, Dalyell).

1860. *Farrella dilatata*, Hincks, Quart. Journ. Micr. Sci. vol. viii. p. 279, pl. xxx. fig. 7.



1866. *Vesicularia fusca* (forma simplex), Smitt, "Kritisk Förteckning, &c." pt. ii., Öfvers. Kongl. Vet.-Akad. Förhand. pp. 503, 524, pl. xiii. fig. 38.

1880. *Cylindrocium dilatatum*, Hincks, Brit. Marine Polyzoa, p. 536, pl. lxxviii. figs. 1, 2, pl. lxxix. figs. 1-3.

In Lang Fiord, on *Bugula Murrayana*. I also found this species at Florö in 1882. The length of the zoëcia is about 1.5 millim.

### Suborder III. CHEILOSTOMATA, Busk.

#### Genus GEMELLARIA, Savigny.

#### 18. *Gemellaria loricata*, Linné.

Tide-marks, Vadsö, and dredged in 120 fathoms in Bög Fiord.

This deep-water form is very delicate and drawn out; the space between the apertures is greater, often much greater, than the length of the apertures. The form is more produced than that figured by Smitt, and much more produced than the tide-mark Vadsö form and usual British specimens. It thus diverges from the type in the opposite direction from the Gulf of St. Lawrence variety, which was named by Dawson *G. Willisii* (see Hincks, pl. iii. fig. 3).

#### Genus BUGULOPSIS, Verrill, 1879.

(Amer. Journ. Science & Arts, Brief Contrib. xliii. vol. xviii. p. 53; and Proc. U.S. Nat. Mus. 1879, no. 190.)

= *Cellularia*, Busk (nec *Cellularia*, Pallas).

Type, *Bugulopsis Peachii* (Busk).

#### 19. *Bugulopsis Peachii* (Busk) = *Cellularia Peachii*, Busk.

Varanger Fiord, in 100-150 fathoms. Verrill in 1879 gave the name *Bugulopsis* to receive the species assigned to *Cellularia* by Busk, a position which could not be maintained. No true *Cellularia* was found in East Finmark; but to explain the use here of the genus *Bugulopsis* I add the following history of *Cellularia* :—

#### CELLULARIA, Pallas.

= *Cellaria*, Lamouroux & Hincks, = *Salicornaria*, Cuvier.

The genus *Cellularia* cannot be used in the sense in which Busk and Hincks have employed it for the following reasons :—Pallas, the author of the genus *Cellularia*, divided it into sections, the first of which was thus defined "*Cellulariæ geniculatæ, undique cellulosaë*," and in it were placed

three species, *C. opuntoides*, *C. salicornaria*, and *C. filiformis*. The second of these is the *Eschara fistulosa*, Linné, and was figured by Ellis on plate xxiii. In Ellis and Solander's work we find the spelling of the name changed, without any reason, to *Cellaria*.

Lamouroux, when he refers to the genus, adopts the spelling *Cellaria*, quotes *Cellularia*, Pallas, as a synonym, and retains only two of the species of Pallas in the genus—*C. salicornaria* and *C. opuntoides*. The spelling of the name was simply changed, the genus is the same, its type *C. salicornaria*. *Cellaria* must disappear as being an absolute synonym of *Cellularia*. In 1817 Cuvier made what was already the type of *Cellularia* the type of a new genus which he named *Salicornaria*. Now "*Cellularia*, Pallas" (sic), has been employed by Busk and Hincks in an entirely different sense; and as used by them *does not contain any species placed by Pallas in his genus*. Under any circumstances therefore—that is, if a type of *Cellularia* had not at a very early date been indicated—Busk's usage could not be maintained. The remarks of Hincks (Brit. Polyz. p. 104) should be consulted also on this point. That author took a step in the right direction when he went back to Solander and Ellis and to Lamouroux, but a step further was required to that excellent author Pallas; and Hincks, unfortunately, used both the names *Cellaria* and *Cellularia*. His *Cellaria fistulosa* must become *Cellularia fistulosa*.

#### Genus MENIPEA, Lamouroux.

= *Tricellaria*, Fleming, 1828, = *Cellarina*, J. van Beneden, 1848.

I think it very doubtful whether Lamouroux's genus can be employed for the northern forms placed in it; Verrill considers that it cannot. *Tricellaria*, which is the next generic name in date, would scarcely be applicable. There remains *Cellarina*, J. van Beneden.

#### 20. *Menipea ternata* (Ellis & Solander).

Vardö and Vadsö (*A. M. N.*); Nordkyn and Sværholt (*Nordgaard*).

#### 21. *Menipea gracilis* (J. van Beneden).

1848. *Cellarina gracilis*, J. van Beneden, "Recherches sur les Polypes Bryozoaires de la Mer du Nord," Bull. Acad. Brux. vol. xv. p. 41, figs. 1, 2.

I am indebted to the late Prof. J. van Beneden for a portion of the type specimen of his *Cellarina gracilis* in the

Brussels Museum; and it is undoubtedly the same as *C. ternata*, var. *gracilis*, of Smitt, and *M. gracilis*, Busk; so that although the name is not changed, it must be assigned to the first-named instead of the last author. Although Van Beneden's lower figure (fig. 2) looks more like *ternata* from its set of three zoëcia, it is merely accidental; for while *M. gracilis* usually has five to nine or even twelve zoëcia in an internode, there may sometimes be found as few as three.

In Van Beneden's *Cellarina gracilis*, as illustrated by the fragment in my possession, which he kindly cut for me in my presence from the type, the lateral avicularia are larger than usual, there is no medium avicularium, the fornix or scutum is of moderate size, and there are two or three oral spines (Van Beneden figures four on young zoëcia); the median zoëcium has no central mucro. Smitt's figure 23 most nearly represents it, but the lateral avicularia are larger; Van Beneden's specimen is exactly like some from Spitsbergen, for which I am indebted to Herr Smitt.

Vardö, Varanger and Sydvaranger Fiords.

A form was dredged in 125-150 fathoms in the Varanger Fiord in which the spines of the zoëcium attained very great development. There were in this form usually three mouth-spines, two of which are of great length, and one of them extraordinarily so, it being from three to four times the length of the zoëcium from which it springs.

## 22. *Menipea Jeffreysi*, Norman.

1893. *Menipea Jeffreysi*, Norman, "A Month on the Trondhjem Fiord," Ann. & Mag. Nat. Hist. ser. 6, vol. xii. p. 446, pl. xix. fig. 1.

A small fragment in Bög Fiord, 150 fathoms.

Genus *SCRUPOCELLARIA*, J. van Beneden.

## 23. *Scrupocellaria scabra*, J. van Beneden.

Varanger and Sydvaranger Fiords (*A. M. N.*), Nordkyn (*Nordgaard*).

Var. *pænulata*, nom. nov.

1893. *Scrupocellaria scabra*, var., Hincks, "The Polyzoa of the St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. ix. p. 427, pl. xxi. fig. 1.

The remarkable form of *Scrupocellaria scabra* described and excellently figured by Hincks in his paper referred to occurs also in East Finmark, where I obtained it among the

rejectamenta of the fishing-boats at Vardö and by dredging in Bög Fiord in 120 fathoms. The great development of the fornix is exactly as represented by Hincks. It not only covers the entire oral opening but extends forwards to about half the length of the oœcium. The frontal avicularia are apparently entirely absent; but a vibracular cell of the unusual character peculiar to *S. scabra* is occasionally, though very rarely, developed. These, however, Hincks failed to find, and upon this ground pointed out that one of the characters which distinguishes *Scrupocellaria* from *Menipea* broke down. These vibracular appendages are usually pretty freely developed on British examples of the typical form, but are rarely present in all the Finmarkian varieties of the species.

Var. *septentrionalis*, nom. nov., subvar. *congesta*, nom. nov.

At Vadsö, between tide-marks, occurred a form of *S. scabra* which in all essential details, in the small size of the lateral avicularia, in the free development of small frontal avicularia, and in the rudimentary character of the fornix, agrees with var. *elongata*, Smitt; and in all these points it has characters which are the exact opposites of those of var. *pænulata* in relation to the typical form of the species. But while thus far agreeing with var. *elongata* it is anything but elongated, indeed just the reverse, for the zoœcia are closely crowded together, so that each overlaps its successor to the extent of nearly half the length of the area; thus the aspect of the entire polyzoary is that of a stout little bush. As the name *elongata*, therefore, is not applicable, I propose a varietal name, *septentrionalis*, with two subvarieties: 1. *elongata*; 2. *congesta*.

Genus CABEREA, Lamouroux.

24. *Caberea Ellisii* (Fleming).

Vardö fishing-boats and Lang Fiord (*A. M. N.*); Sværholt (*Nordgaard*).

Genus KINEKOSKIAS, Danielssen.

25. *Kinekoscias arborescens*, Danielssen.

1867. *Kinekoscias arborescens*, Danielssen, Förhand. Videns.-Selskab. Christiania, p. 23 (*vide* Koren and Danielssen, this paper not being in my library).

1867. *Bugula umbella*, Smitt, "Kritisk Förteckning, &c.," Æfvers. K. Vet.-Akad. Förhand. pp. 292 & 353, pl. xix. figs. 28-31.



1877. *Kinekoskias arborescens*, Koren and Danielssen, Fauna Littoralis Norvegiæ, part 3, p. 107, pl. xii. figs. 9-14.

1894. *Kinekoskias arborescens*, Norman, "A Month on the Trondhjem Fiord," Ann. & Mag. Nat. Hist. ser. 6, vol. xiii. p. 113.

The two type "specimens of this species were found by Danielssen at Vadsö at a depth of 90 fathoms on a clayey sand bottom."

Genus *BUGULA*, Oken.

26. *Bugula purpurotincta*, Norman.

Lang Fiord (*A. M. N.*), Mehavn \* (*Nordgaard*).

27. *Bugula Murrayana* (Johnston).

In the fiords generally.

a. Var. *fruticosa*, Packard.

1863. *Menipea fruticosa*, Packard, "List Animals dredged Caribou Island, Southern Labrador," Canad. Naturalist and Geologist, vol. viii. p. 9 (separate copy), pl. i. fig. 3.

1867. *Bugula Murrayana*, var. *fruticosa*, Smitt, "Kritisk Förteckning, &c.," l. c. pl. xviii. fig. 23.

Varanger and Bög Fiords, 50-120 fathoms.

b. Var. *quadridentata*, Lovén (MS.).

*Bugula Murrayana*, var. *quadridentata*, Smitt, "Kritisk Förteckning, &c.," l. c. pl. xviii. figs. 25, 26.

Bög Fiord in 120 fathoms, with var. *fruticosa*, of which it is a very narrow form, not more than two zoëcia wide. Taken also by the Norwegian North Atlantic Expedition, Stat. 262, off Vardö, 148 fathoms.

Genus *CARBASEA*, Gray, 1848.

= *Flustrina*, J. van Beneden, 1849, = *Semiflustra*, d'Orbigny, 1851.

I take this opportunity of making some remarks on this genus. *Carbasea* is one of the cases in which the structure of the polyzoary may be conveniently used as a generic character. One group of *Flustra* is composed of a double series of zoëcia, back to back, and these are typical of the genus; but another has invariably only a single layer of zoëcia, and these constitute Gray's genus *Carbasea*. The genus has five North Atlantic and Mediterranean representatives, viz. *Carbasea membranaceo-truncata*, Smitt (Arctic),

\* Mehavn is a small village lying between Lakse Fiord and Tana Fiord.

*C. pusilla*, Hincks (Adriatic), *C. pedunculata*, Busk (about lat.  $38^{\circ}$  N. and long.  $28^{\circ}$  W., in 450–900 faths., ‘Challenger’), *C. papyrea*, Pallas (Mediterranean), and *C. Solanderi*, nom. nov. (boreal). A few remarks on the last two species may here be added:—

*Carbacea papyrea*, Pallas.

1725. *Porus cervinus*, Marsillus, Hist. Phys. de la Mer, p. 64, pl. vi. figs. 25, 26.

1766. *Eschara papyrea*, Pallas, Elenchus Zoophyt. p. 56.

1767. *Flustra papyracea*, Linn. Syst. Nat. ed. xii. p. 1301.

1879. *Flustra carbacea* (nec Ellis & Sol.), Waters, Ann. & Mag. Nat. Hist. ser. 5, vol. iii. p. 119.

1889. *Flustra papyracea*, Carus, Prod. Faun. Med. vol. ii. p. 9.

1896. *Flustra papyrea*, Waters, “Interzoecial Intercommunication in Flustridæ and Notes on *Flustra*,” Journ. Mic. Sci. p. 287.

Zoœcia rhombic or lozenge-shaped, being angled at the middle of their sides; of nearly the same length as those of *C. Solanderi*, being about 1 millim., but wider, 0.65 to 0.75 millim., narrowed both anteally and postally, the greatest breadth being in the middle; the anterior extremity and oral opening markedly narrower than in *C. Solanderi*. Oœcia of moderate size, semiglobose, well raised.

Specimens in my collection are from Naples (Zool. Stat. sent as “*Flustra carbacea*”) and Mediterranean (Mr. Waters as “*Flustra papyrea*,” Pallas). The species is not only distinct with respect to the form of the zoœcium, but it is also furnished with oœcia, which are well represented on my Naples example, though Mr. Waters states that he has never seen any; while oœcia are unknown in *C. Solanderi*. Considering the date of the work of Marsillus, his figure gives an admirable idea of the form of the cells and the extent of variation in that form. A comparison of the two following passages is certainly curious:—“Attachées à la Roche, quoique sans Racine. J’en ai une en mon Cabinet, qui tient à l’écorce d’un petit Cancre” (Marsillus, A.D. 1725). “This is very common upon a Crab (*Pisa armata*), which usually carries a small colony of this *Flustra* on its back. I do not remember seeing any at Naples except from this Crab” (Waters, A.D. 1879). In this species Waters tells us that there are only one distal and two lateral rosette-plates, each with only a single pore.

28. *Carbacea Solanderi*, nom. nov.

1786. *Flustra carbacea*, Ellis and Solander, Nat. Hist. curious and uncommon Zoophytes, p. 14, pl. iii. figs. 6, 7 (et auct. plur.).

1848. *Carbacea papyracea*, Gray, List Brit. Anim. Brit. Mus., Cœtronæ, p. 105 (nec *Flustra papyracea*, Linn.; nec *Flustra papyracea*, Ell. & Sol.).

1848. *Flustrina carbacea*, J. van Beneden, Bull. Acad. Roy. Belg. vol. xv. p. 651.  
 1851. *Semiflustra carbacea*, d'Orbigny, Palæont. Franç., Terr. Crét. vol. v. p. 326.  
 1867. *Flustra papyrea*, Smitt, "Krit. Förteck., &c." pp. 359 & 380, pl. xx. figs. 9-11 (nec *Eschara papyrea*, Pallas).

This species, which is also *Flustra papyrea* of Busk (B. M. Cat.) and *Flustra carbacea* of Hincks (Hist. Brit. Polyz.), is distinguished from *C. papyrea* by its loop-shaped or linguiform zoœcia, which are proportionately wider in front and narrower in the middle than in that species; and are entirely devoid of the angular projections in the middle of the lateral margins. Oœcia are not known to occur. Its distribution is boreal and arctic, from Britain to Spitsbergen and Greenland. In this species Waters describes numerous distal and six lateral rosette-plates—the former with a single pore, the latter with several pores.

Nordgaard records this species from Sværholtklubben.

## 29. *Carbacea membranaceo-truncata* (Smitt).

1867. *Flustra membranaceo-truncata*, Smitt, "Kritisk Förteck., &c." p. 358, pl. xx. figs. 1-5.  
 1884. *Flustra membranaceo-truncata*, Vigelius, Die Bryozoen 'Willem Barents,' p. 10, pls. i.-vi.

According to Waters this species has three distal and six lateral rosette-plates, all with only one pore. Vigelius (*l. c.*) has published a most elaborate memoir on this species. The margins of the zoœcia are typically quite unarmed, but in a specimen from 150 fathoms in the Varanger Fiord I find a spine on each side at the front corner of the lateral margins. In an example from Greenland similar spines occur, while they are wholly absent from other Greenlandic specimens, from those in my collection from the St. Lawrence, and from others kindly given me by the describer, Herr Smitt, from Finmark and Spitsbergen. Off Vardö, in 148 fathoms, 'Voringen' Expedition.

## Genus FLUSTRA, Linné.

## 30. *Flustra abyssicola*, M. Sars.

1872. *Flustra abyssicola*, G. O. Sars, 'Some remarkable Forms of Animal Life,' Christiania, p. 19, pl. ii. figs. 25-30.

Dredged by the 'Voringen' in 148 fathoms off Vadsö.

## “MEMBRANIPORA.”

The so-called genus *Membranipora* contains a heterogeneous assemblage of forms which only agree in these particulars—namely, that a larger or smaller portion of the front wall consists of a membranous covering, and that the oral opening is generally of the simplest character in the anterior part of this membrane. It has always been a matter of surprise to me that, though Hincks removed two or three species to other genera, he left such a strange assemblage of forms to be associated with *Membranipora membranacea*. The explanation is, I suppose, that he relied almost entirely on the oral opening for the establishment of his genera. I cannot but think that in dividing this group use should be made of the presence or absence of the oœcium, for the mode of reproduction must be of more importance than most other characters. The character of the oœcium when present, and the partial or entire membranous epitheca, must be considered. The absence or presence of avicularia, their character, whether occupying a separate chamber or belonging to the zoœcium, their position and structure are more or less valuable according to other characters which accompany these differences. Mr. Waters, Herr Levensen, and others have devoted much time and labour to the examination of the pore-chambers and rosettes: the former has summarized his observations in his paper “Observations on the Membraniporidæ,” Journ. Linn. Soc., Zool. vol. xxvi. 1898, p. 654; and Herr Levensen has given figures of the pore-chambers of several species in his excellent ‘Zoologica Danica, Mosdyr,’ 1894. In the preparation of this paper I have examined almost every northern species with respect to the pore-chambers, and have found them to be very valuable as generic characters. They are often very easily seen; but in some cases, though they exist in the walls of the zoœcia, they do not project beyond them and are then often very difficult to determine with certainty. I have used three methods in their examination: first, incineration; secondly, boiling in liquor potassæ; thirdly, placing in Eau de Javille. The use of the latter destroys not only the soft tissues but dissolves chitine, so that it must not be used when it is desired to observe the opercula.

I have illustrated the pore-chambers of several species, but have purposely omitted drawings of those species which Levensen has already figured, unless the species is the type of a genus as here instituted.

I may mention two little matters which have struck me as interesting in my investigations:—



First, as to incineration. *Megapora ringens* is the only species which, when subjected to fire, has shrivelled up to nothing, yet when treated with Eau de Javille it is found to have a calcareous skeleton; while *Setosella vulnerata*, small as it is, has a strong calcareous front wall which resists fire; and *Membranipora membranacea* when burnt is shown to have a well-developed calcareous structure.

Secondly, it was a surprise to me to find that the largest of all our Cheilostomata, *Eschara foliacea*, as also its variety *fascialis* of the Mediterranean, when dissolved in nitric acid, should exhibit scarcely a trace of chitin, less so than in any other species which I have similarly treated. When the calcareous matter is got rid of scarcely a sign of anything is left except the opercula, which stand out entirely by themselves, so that no teasing is required or indeed could be applied.

#### Genus HINCKSINA\*, gen. nov.

Zoëcia incrusting, having the entire area membranous, the margin surmounted by numerous spines. Oëcia small, short, and little raised. Avicularia occupying distinct cells sparingly scattered among the zoëcia, oval, with semicircular mandible. No pore-chambers.

Type, *Hincksina (Membranipora) flustroides*, Hincks.

This genus with its separate avicularian cells and absence of pore-chambers should, I think, be removed to the family Flustridæ. Waters mentions six lateral rosette-plates.

#### Genus MEMBRANIPORA, Lamouroux.

Type, *Membranipora membranacea* (Linné).

The *Flustra membranacea*, Linné, has by general consent been accepted as the type of this genus. No other species placed in it by Hincks are congeneric or even belong to the same family. A family Calloporidæ with genus *Callopora* as type will include most of the genera provided with pore-chambers, &c.

Front wall entirely membranous; no oëcia; no avicularia (furnished with tower-cells of unknown use?). No pore-chambers. No lateral spines. Rosette-plates two distal, and two to four lateral, with many pores (*Waters*).

#### 31. *Membranipora membranacea* (Linné).

Nordkyn (*Nordgaard*).

\* After the author of 'British Marine Polyzoa.'

## Genus ELECTRA, Lamouroux, 1834.

Type, *Electra verticillata*, Lamouroux.

See Norman, "Month on the Trondhjem Fiord," Ann. & Mag. Nat. Hist. ser. 6, vol. xii. p. 113.

With respect to the synonyms I gave in the place referred to :—

1st, *Amphiblestrum*, Gray. All that I wrote in the note is, I believe, correct ; but I have since examined the specimens in B. M. which Gray had named *A. membranacea*, Abild., and find that they are not that species, but the *Amphiblestrum Flemingii*, Busk. It seems to me therefore that the specimens should take precedence of the name erroneously given to them by Gray, and that the genus *Amphiblestrum* may be used in the sense in which Busk employed it, for although he makes no reference to the matter, he no doubt had himself examined these specimens in the British Museum.

2nd, *Conopeum*. I have re-examined the specimens in B. M. referred to this genus and find them, as I stated then from long memory, to be *M. Lacroixii*. If it should be deemed therefore at any time desirable to use a separate genus for that species, *Conopeum* is ready for the purpose.

This genus is not furnished with pore-chambers. At one time I was inclined to unite in one species *M. Lacroixii*, Audouin, and *M. monostachys*, Busk. They often occur together on the same oyster or other large shell, mingled in such a way as to be puzzling ; but I am now satisfied as to their specific difference. I may here mention that I have failed to observe in any northern specimen examined by me such a back with lucid spots as that represented by Waters in his paper on the Membraniporidæ, pl. xlviii. figs. 14, 15, or such an operculum as he refers to *M. Lacroixii*\* ; but I do see on most specimens examined the two processes at the distal extremity, which look as though they were for muscular attachment. The following I regard as some of the specific differences between *E. monostachys* and *E. Lacroixii* :—

*Electra monostachys*. Typically there is a single spine at

\* I am indebted to Dr. Levensen for a very interesting form of *E. monostachys* from Denmark which has a *calcareous* operculum, but of quite a different form from that figured by Waters and attributed to *Lacroixii*. I subsequently sent to Dr. Levensen specimens of our British var. *fossaria*, Hincks, and he found them to agree with his variety from Denmark in having *calcareous* opercula &c. I may say that with respect to figures given by Levensen in the 'Zoologica Danica, Mosdyr,' 1894, I should refer his figs. 37, 38, 40 to *E. monostachys* and fig. 39 to *E. Lacroixii*.

the lower margin of the area; when this is present it at once determines the species among northern forms. Under favourable conditions, more especially in young incrusting colonies, the lateral margins may be furnished with a pair of spines by the oral opening, or numerous spines all along the margin, but in these cases the basal spine is always the largest and characteristic. When the colony is entirely devoid of spines, it may be distinguished from *E. Lacroixii* by the lateral margins being smooth, except that their inner edge may be very slightly granulated, but the calcarous posterior portion of the front wall is *smooth*.

*E. Lacroixii* in favoured positions may have a few extremely fine and delicate spines on the lateral margins with the front pair of larger size, or these latter only present (but never the distinctive posterior central spine of *E. monostachys*). Apart from spines this species may be distinguished from the last by the coarsely granulated character of the entire margins, *including the whole portion posterior to the membranous area*. When present, moreover, the remarkable "hollow triangular spaces," scattered often in extraordinary numbers among the zoëcia, are at once distinctive. Hincks wrote of these: "They are not true avicularia, but consist of a three-cornered area inclosed by calcarous walls and covered in by a transparent membrane." The membrane is frequently destroyed, and they then appear as hollow triangular structures, which bear a general resemblance to a hollow occupied by a pointed form of avicularium.

*M. Lacroixii* and *M. monostachys* are only provisionally placed in the genus *Electra*: further observations are necessary to determine their position. In 1894 Levinsen united the three species *Lacroixii*, *monostachys*, and *catenularia*, Jameson, under the last name. *M. catenularia* is a species which in the boreal and arctic fauna appears to stand quite by itself. It has been placed by McCoy in a genus *Pyripora*.

32. *Electra pilosa*, Linné.

Nordkyn (*Nordgaard*).

#### Fam. Calloporidæ.

Genus CAULORAMPHUS \*, gen. nov.

Front wall entirely membranous, the calcarous border bearing spines. Avicularia stalked and situated among the

\* *καυλός*, a stalk; *ράμφος*, a bird's beak.

spines on the lateral margin of the zoëcium (oëcia, when present, very shallow and inconspicuous). Pore-chambers in the type three pairs of lateral and one terminal; the latter is sometimes divided into two or even three small chambers.

Type, *Cauloramphus spinifer* (Johnston) (Pl. XIII. fig. 1).

### 33. *Cauloramphus cymbæformis* (Hincks).

1867. *Membranipora spinifera*, Smitt, "Kritisk Förteckning, &c." p. 366, pl. xx. fig. 32 (nec *M. spinifera*, Johnston).

1877. *Membranipora cymbæformis*, Hincks, "Polyzoa of Iceland and Labrador," Ann. & Mag. Nat. Hist. ser. 4, vol. xix. p. 99.

1881. *Membranipora spinifera*, Vigelius, Zoologischen Ergebnisse 'Willem Barents,' Polyzoa, p. 12.

1887. *Membranipora cymbæformis*, Hincks, "Polyzoa of the St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. i. p. 217, pl. xv. fig. 4.

Vardö, in 1890: when I took this species it was new to the Norwegian Fauna, but it has since been recorded by Nordgaard from Hammerfest. Specimens in my collection are also from Spitsbergen (*Smitt*) and the Gulf of St. Lawrence (*Dawson and Whiteaves*).

I have never seen this species on stone or shell; so far as my observations go, it grows either on branching Polyzoa or Hydroids.

*Cauloramphus spinifer* has not as yet occurred in Norway either to Nordgaard or myself; its most northern locality at present known to me is Shetland, but it will probably be yet found between tide-marks in Southern Norway.

### Genus CALLOPORA, J. E. Gray.

*Callopora*, Gray, List Brit. Anim. Brit. Mus., Centroniæ, 1848, pp. 109 & 146.

Type, *Callopora lineata*, Linné.

Front wall entirely membranous. Marginal walls more or less thickened and crowned with spines, which may be many or few. Oëcia globose, of good size, commonly with a rib across the front. Sessile avicularia with acute mandible at the bottom of the zoëcium and above the oëcium or in a lateral position on one or both sides of the oral opening, or in both positions in the same species. Usually two pairs of lateral pore-chambers and one distal; size and form of the chamber varying with the species\*. In

\* It will be understood that two pairs of lateral pore-chambers added to the pore-chambers on the other side of the walls of the hinder part of the zoëcium implies that there are at least four rosette-plates on the side.



*C. unicornis* pore-chambers are rarely developed, but sometimes one or two may be so.

I have examined the pore-chambers in the following species, which I would include in the genus. Two pairs of lateral and one distal pore-chambers are present in *lineata*, *craticula*, *Whiteavesii*, *Dumerilii*, *aurita*; two pairs of lateral and ? one distal (the latter not being clearly seen) occur in *Sophia*. Levinsen has placed *unicornis* among the species which have no pore-chambers; that is true as a rule, but rarely there is one chamber or one pair of lateral chambers, and rarely two pairs, and this applies also to var. *armifera*, Hincks. I have not been able to see the pore-chambers in *nigrans*, as it is usually loosely attached and the back is too solid and dark to enable the pore-chambers to be seen. Of *curvirostris* and *arctica* (Smitt) my specimens are too small to allow of sacrificing them; and *discreta*, Hincks, is unknown to me. In *craticula* and *Whiteavesii* the membranous area occupies only the central portion of the front wall, and outside the spines which surround it there is a calcareous crust of some breadth which completes the front wall.

34. *Callopora lineata* (Linné). (Pl. XIII. fig. 2.)

Vadsö, on seaweeds; stones and shells of *Buccinum grælandicum*, var. *nuda*; at Vardö on *Neptunea despecta*; also Svolvær and in Bergen and Hardanger Fiords. The East Finmark specimens which I have seen are remarkable from the absence of both oœcia and avicularia. Spitsbergen with oœcia and avicularia (from Smitt).

35. *Callopora craticula* (Alder). (Pl. XIII. fig. 3.)

Varanger Fiord in 100–125 fathoms; and I may add "Finmark" (Smitt, as "*M. lineata*"), West Greenland, 'Valorous,' Gulf of St. Lawrence (*Whiteaves*).

The figure of Hincks is not quite satisfactory: it does not illustrate how close the flattened glistening spines are to each other at their edges; nor does he show any avicularium at the top of the oœcium, which is its usual position. The spines in this species ordinarily almost meet and even cross in the centre, thus forming a kind of roof over the zoœcium; and if the tips of the spines coalesced we should have a *Membraniporella*, but in this case they do not show the slightest tendency to form union.

*Callopora Whiteavesii*, sp. n. (Pl. XIII. fig. 9.)

1867. *Membranipora lineata*, Smitt (partim), "Kritisk Förteckning, &c." pl. xx. fig. 26.

Zoœcia small, 0.5 millim., oval, each area with its own

distinct calcareous margin, margin of area in living specimens porcelain-white; surmounted by about fourteen to sixteen spines, which are short, slender, and almost upright, very easily abraded. Oœcium globose, porcellanous; either smooth (as in Smitt's figure) or having a raised pointed arch in front (somewhat as in *M. aurita*), caused by the incorporation of two of the spines into the front wall of the oœcium. Avicularia, if any, unknown.

As compared with its close ally, *C. craticula*, the zoœcia are larger (from the same district), the spines more slender and nearly upright, the oœcium without the rib, and avicularia are (apparently) altogether absent.

A peculiarity in this species is its appearance when the spines are all abraded; the membranous front wall appears thickened, and has a yellow and waxy appearance. It might be supposed to be chitinous, but it is dissolved away at once in acid, and only the primitive membrane remains. On the other hand, it is not destroyed by liquor potassæ, and thus it would appear that the strengthening material is calcareous.

Thirty-five miles off Cape Rozier, Gulf of St. Lawrence (*Whiteaves*, after whom I name the species); off Holsteinborg, Greenland, 57 fathoms, 'Valorous,' 1875; Spitsbergen (*Smitt*, as "*M. lineata*").

The species perhaps comes nearest to *M. discreta*, Hincks, but this Arctic form certainly is not remarkable for the margin being "cut into lobes" nor do the spines "incline inwards."

### 36. *Callopora Sophiæ*, Busk.

? 1851. *Reptoflustrina arctica*, d'Orbigny, Palæont. Franç., Terr. Crét. vol. v. Bryozoaires, p. 582.

1855. *Membranipora Sophiæ*, Busk, Quart. Journ. Micr. Sci. vol. iii. p. 255, pl. i. fig. 7.

1884. *Membranipora Sophiæ*, form *matura*, Hincks, "Polyzoa Queen Charlotte Islands," Ann. & Mag. Nat. Hist. ser. 5, vol. x. p. 9 (separate copy).

1886. *Membranipora arctica*, Lorenz, Bryoz. Jan Mayen, p. 8, pl. vii. fig. 1 (separate copy).

1900. *Membranipora arctica*, Waters, "Bryozoa from Franz-Josef Land," Journ. Linn. Soc., Zool. vol. xxviii. p. 60.

There are commonly two and sometimes three pairs of lateral spines, sometimes none are present. The lateral avicularia have the *mandible pointing upwards and inwards*. The oœcium ordinarily bears a semicircular rib (see Busk's original figure, and Smitt, fig. 24), but sometimes a pair of spines being taken into the front wall it presents an acute-angled rib instead. In the space between the zoœcia there

is often developed an acute mandibled avicularium, sometimes a raised process without avicularium (see Smitt, figs. 25 & 27, and Lorenz's figure); and when the zoëcium below a median avicularium bears an oëcium, the latter is tilted up, and the avicularian process is seen behind it at a lower level. In older specimens without oëcia the interzoëcial space has a raised wall inclosing a hollow space within it, most variable in shape (square, oblong, triangular, round, or crescentic), the avicularium is no longer seen, but in one or two instances I have seen the space covered with a membrane with a central opening or pore, in others instead of any hollow a large nodule with the avicularium on one side of it. The zoëcia in this species are smaller than in *C. unicornis*, var. *armifera*, from which it is most readily distinguished by the lateral avicularia having the mandible directed *upwards and inwards* (instead of *downwards and outwards*): it seems but a small difference, but would appear to be constant.

When *C. Sophia* is found living in exposed situations, such as the shell of living *Neptunea despecta*, spines are not ordinarily seen, and the margin of the zoëcia becomes much thickened and strongly granulated.

The variations are very great. In some Spitsbergen specimens, for which I am indebted to Smitt, the whole space between the zoëcia is elevated into a flat-topped, nearly square, slab-like plate; at each corner of the slab is a lateral avicularium, those at the bottom of the slab belonging to the zoëcium below, and those at the top belonging to the alternating zoëcia on either side above; in front is seen the arch of the oëcium, which thus would seem to lie under the slab.

Varanger Fiord (*A. M. N.*), Sværholt (*Nordgaard*). Other specimens in my collection are from "Finmark" and Spitsbergen (*Smitt*), North Cape (*A. M. N.*), west of Holsteinborg, Greenland, in 57 fathoms ('Valorous,' 1875), Davis Strait (*A. Hancock*), Gulf of St. Lawrence (*Whiteaves*).

*Callopora unicornis*, Fleming, var. *armifera*, Hincks. (Pl. XIII. figs. 10, 11.)

1867. *Membranipora lineata*, forma *americana*, Smitt, "Kritisk Förteckning, &c." p. 366, pl. xx. fig. 31.

1880. *Membranipora armifera*, Hincks, "Contrib. gen. hist. Polyzoa," Ann. & Mag. Nat. Hist. ser. 5, vol. vi. p. 82, pl. xi. fig. 5.

1892. *Membranipora armifera*, Hincks, "Polyzoa St. Lawrence," Ann. & Mag. Nat. Hist. ser. 6, vol. ix. p. 155, pl. viii. fig. 4.

1898. *Membranipora Sophia*, var. *armifera*, Waters, "Observations on the Membraniporidæ," Journ. Linn. Soc., Zool. vol. xxvi. p. 860, pl. xlvi. fig. 18.

At the outset let me say that I consider that Hincks's *M. armifera* has nothing to do with *C. Sophieæ*, with which Waters has united it. It can at once be distinguished by the avicularia on the sides of the oral opening, which in the former *point downwards and outwards*, and in the latter *point upwards and inwards*. An examination of specimens from many localities proves that this is an unvarying rule. Secondly, let me add that, notwithstanding the presence of these lateral avicularia in *M. armifera*, I am unable to regard it as more than a very interesting Arctic form of *C. unicornis*, Fleming. I arrive at this conclusion because it resembles *unicornis*—and it alone among allies—in usually possessing no pore-chambers; in the form of the oœcium and its surmounting avicularium; in the presence sometimes of a pair of lateral spines, of which one is of moderate length and acutely pointed at the end, while that which is opposite to it is immensely developed, of great length, and in the form of a hollow tube.

The peculiarity which at once distinguishes it from typical *C. unicornis* is the presence of avicularia at the sides of the oral opening (see Pl. XIII. figs. 10, 11) with the mandible pointing downwards and outwards. Commonly these avicularia are on each side: sometimes on one side only and on the other a spine; sometimes over considerable spaces, or a whole polyzoary, they are altogether absent. I have never seen both avicularia and both lateral spines developed on the same zoœcium; the former when present would seem to supersede the latter. Besides the lateral pair of spines there is, at each corner of the upper margin, a small spine, and these spines often remain buried in the oœcium, in which minute round holes (for the spines are hollow) seen at the lower corners of the oœcium indicate their presence. The oœcium is similar to that of *C. unicornis*, with a similar arched rib in front; and, as in that species, at the base of the zoœcium is an avicularium of considerable size and pointed mandible; when the oœcium is developed this avicularium is seen above and appears to be part of it. Occasionally this avicularium attains immense size (see Hincks's figure in his paper of 1892 and my figure, Pl. XIII. fig. 11). My specimen, which has these very large avicularia, is from Torske Bank, West Greenland, and all the avicularia over the zoarium are of the same abnormal size. Now it is curious that this zoarium should have been found on a large valve of *Pecten islandicus*, and that on the other parts of the same valve were two other zoaria of the same species, on which the oœcia were of the normal dimensions (Pl. XIII.



fig. 10). The length of a zoæcium is about 0·8 millim., while that of *C. unicornis* is 0·6 millim.; but there is considerable variation in the size of both forms.

*E. unicornis*, var. *armifera*, is in my collection from the following localities:—Spitsbergen (Smitt as “*Membranipora unicornis*”); Upper Torske Bank, W. Greenland (‘Valorous,’ 1875); Gulf of St. Lawrence (*Whiteaves*); Nantucket, N.E. America (received among some unnamed specimens from Prof. Verrill).

One difficulty presented to us in studying the Polyzoa is the circumstance that all the zoæcia in a polyzoary imitate any marked peculiarity of varietal characters which is developed on the earliest zoæcia; and thus, without a series of specimens to show the connecting-links, such a specimen may be regarded as possessing more permanent characters than it is entitled to: the two forms of this species on the *Pecten* from the Torske Bank are a case in point, which might be multiplied endlessly. Even if the earliest zoæcia are of smaller or larger size than usual, the whole colony will follow suit and maintain that dimension. I have made some observations on this subject in my paper “A Month on the Trondhjem Fiord,” when treating of *Electra pilosa* (Ann. & Mag. Nat. Hist. ser. 6, vol. xiii. 1893, pp. 121, 122).

*Callopora nigrans*, Hincks. (Figs. 1, 2.) \*

? 1851. *Reptofustrella americana*, d'Orbigny, Palæont. Franc., Terr. Crét. vol. v. p. 571.

1867. *Membranipora lineata*, forma *americana*, Smitt, “Kritisk Förteckning, &c.” p. 266 (*partim, nec figuræ*).

1882. *Membranipora nigrans*, Hincks, “Polyzoa Charlotte Islands,” Ann. & Mag. Nat. Hist. ser. 5, vol. x. p. 9 (separate copy), pl. xix. fig. 2.

1900. *Membranipora macilenta*, Waters, “Bryozoa Franz-Josef Land,” Journ. Linn. Soc., Zool. vol. xxxviii. p. 61, pl. viii. fig. 10.

Zoæcia very large, commonly 0·8 and 0·9 millim., ovate (oblong or linguiform when crowded), margin crenated; oral opening large, semicircular; a lateral avicularium is soon developed high up on each side, with acute mandible pointing obliquely downwards. The zoæcium is now in the condition in which it is represented by Waters and my fig. 1*b*. Next, above the zoæcium is produced a transversely oblong fillet, the margins of which are slightly raised, so that there is a slight hollow on the middle portion, and the distal corners are rounded off (see fig. 2*a*). Next, upon the

\* Figures of this species will be given with the next part; those here mentioned refer to them.

rounded corners there grow out nodulous processes, sometimes of very considerable size, and the slight central hollow is filled up; the structure now assumes the form of fig. 2 c. When this nodulous growth is fully developed the zoarium has a very peculiar appearance, and reminds us somewhat of *C. aurita*, for the lateral avicularia of the two alternating zoecia above nearly meet, and rarely actually coalesce with the nodulous interzoecial growth which has been described. The foregoing would appear to be a peculiar form of oecium and it is that which is the common one found in the species. Very rarely, so far as my observations go, the form of a shallow cap is taken on (fig. 2 a), and this is the oecium, which Hincks figured from the Charlotte Isles. On one portion of my specimen from the 'Vega' Expedition a very different form of oecium is found (fig. 1 c): I have seen it only on zoecia in which the usual lateral avicularia are absent. The form taken reminds one of a "fool's cap," the front rim of which is well rounded; from this the oecium narrows gradually, and at the same time is also more depressed, until it ends in a nodulous process. There are perhaps twenty such oecia together, though there is considerable variation in their exact length; close to them are, on other zoecia, oecia of the ordinary form (fig. 2 b).

This is a very large species, which grows most luxuriantly and is generally only loosely attached to the object on which it is developed. It is of a rich deep brown colour, Hincks says "deep black," but, notwithstanding that statement, he has given it a very expressive specific name in "*nigrans*." I have compared my specimens with the type of Hincks, from the Charlotte Islands, which is now in the British Museum; and the 'Vega' locality, which I shall presently give, affords additional evidence that it is a circumpolar form.

It may be the *Reptoflustrina americana* of d'Orbigny. Smitt refers to that species, which was found at Newfoundland, and he also states that the species from Labrador which Packard recorded under the name "*?Lacroixii*," but without any description, was, from specimens sent to him by that writer, identical with what he calls "*forma americana*." It must remain in some doubt to which of two forms Smitt in that statement refers, for while his fig. 31 with its large avicularia on the ovicells undoubtedly represents what I have here described as *C. unicornis*, var. *armifera*, specimens which he kindly sent to me named "*forma americana*" are as undoubtedly that which I here refer to *C. nigrans*, Hincks, which, among other marked characters, never has large avicularia on the oecia.

Specimens here described are from Spitsbergen (*Smitt*), and others were found growing luxuriantly on a shell of *Neptunea fornicata*, given me by Prof. Lovén, from the Stockholm Museum, and which was dredged by the 'Vega,' lat. 66° 58' N., long. 171° 35' E., that is, in Bering Strait; while the type described by Hincks came from Queen Charlotte Islands, and the early stage of development figured by Waters from Franz-Josef Land. It is thus a circumpolar form.

Genus *Oochilina*, gen. nov.

Type, *Oochilina* (*Membranipora*) *crassimarginata*, Hincks.

Zoëcia with front wall entirely membranous, ovate (long ovate or short ovate, more rarely linguiform), depressed, with crenated or smooth margin, no lateral spines. A round, oval, or oblong avicularian chamber developed between and taking the place of a zoëcium; avicularium typically with a complete bar, the mandible rounded (or acute). Oëcium semiglobose. (Pore-chambers?)

Besides *O. crassimarginata* and *O. tensa*, the following are apparently referable to this genus: *M. tenuirostris*, *velata*, *plana*, and *valde-munita*, of Hincks; *M. papulifera* and *Biflustra perfragilis*, MacGillivray; and perhaps *M. gregaria*, Heller.

The bar of the avicularium is complete and the mandible rounded in *O. crassimarginata* and *O. tensa*; but the bar is incomplete and the mandible acute in some of the species which I have temporarily assigned to the genus.

*Oochilina tensa*, sp. n. (Pl. XIII. fig. 12.)

Spreading on stones as a thin coating in large patches. Zoëcia normally oval, but owing to pressure on each other, &c., they assume various forms—nearly oblong, linguiform, or lozenge-shaped; the frontal membrane is very thin, delicate, and transparent; the side walls are lightly formed, only showing symptoms here and there of crenulation of the border. In a separate chamber between the zoëcia is situated an avicularium, small and not nearly occupying the whole of the top of the chamber; the bar complete, the mandible rounded; the avicularium is perpendicularly placed. Oëcia subglobose, well raised, porcellaneous, and of a milk-white colour and smooth surface.

On pieces of stone, chiefly granite; dredged in the Bergen Fiord in 1878, and in the Hardanger Fiord in 1879.

It would be very easy to mistake this delicate creeping form for incrusting *Flustra Barleei*, but in that species the avicularium holds a decidedly oblique position, and the

oœcia are not prominently raised and are also smaller in size than in this species.

#### Genus ELLISINA\*.

Type, *Ellisina* (*Membranipora*) *levata*, Hincks.

Differs from *Oochilina* in not having avicularia occupying separate cells between the zoœcia; but, instead, furnished with avicularia, ovoid or triangular, situated on the hinder portion of the zoœcium. The oœcium is well developed, typically with a flattened area on its front. In the type species the pore-chambers are very large (Pl. XIII. fig. 4): one distal; the position of the remaining chambers is very unusual, the two front lateral pairs project *outside* the side walls; and the two posterior pairs are seen *inside* the side walls, which is the reverse of the usual rule.

*Membranipora albida*, *coronata*, and *minuscule* of Hincks, and *M. incrustans*, Waters, would seem to belong to this genus.

#### Genus ALDERINA †, gen. nov.

Front wall entirely membranous, side walls usually crenulated; no lateral spines. No avicularia (but nodulous processes sometimes developed in different positions on the side of the zoœcium). Oœcium usually bearing (either a rib or) a depressed area in front. Pore-chambers in the type, two pair of lateral and two distinctly marked and separated distal (well figured by Levinson, Zool. Dan., Mosdyr, 1894, pl. iv. fig. 27). As in *Ellisina*, the two front pairs of pore-chambers usually extend outside the lateral walls, and the two posterior inside.

Type, *Alderina* (*Membranipora*) *imbellis*, Hincks.

I provisionally place *M. solidula* in this genus, but it differs considerably from the type. The parts of the generic description which are in brackets apply to it, and not to *A. imbellis*.

Pl. XIII. fig. 8 represents the front portion of a young zoœcium at the edge of the zoarium of *A. solidula*.

#### Genus AMPHIBLESTRUM, Gray.

Type, *Amphiblestrum Flemingii*, Busk ‡. (Pl. XIII. fig. 5.)

Hinder portion of the area covered with a calcareous

\* After John Ellis, the old and excellent author on "Corallines."

† Named after that excellent naturalist, J. Alder, the dearly loved friend of bygone years.

‡ See Busk, Report 'Challenger' Exped., Polyzoa, 1884, p. 65.



crust; in front of this a considerable portion of the area, typically trifoliate, but sometimes semielliptic or subrotund, is covered only by a thin membrane, at the distal extremity of which is situated the simple oral opening. Margin of zoecium thickened, often granulated, sometimes bearing a pair (or more) of lateral spines; oral spines found in young specimens. Reproduction by means of prominent oœcia. Sessile avicularia often present, sometimes one, sometimes two on the hinder portion of the zoecium. Pore-chambers: two pairs of lateral and one distal.

The pore-chambers are very conspicuous in *M. Flemingii*, but narrow and difficult to see (if always present?) in *M. trifolium*.

37. \**Amphiblestrum trifolium* (Busk). (Pl. XIII. fig. 6.)

Svolvær, Lofoten Islands; not yet found in East Finmark. Other specimens in my collection are from Shetland, type and var. *quadrata* (*A. M. N.*); Wick, N.B., var. *quadrata* (*C. Peach*); Adriatic as "*M. Flemingii*" (*Prof. Heller*); Bergen Fiord, Norway (*A. M. N.*); Greenland ('Valorous,' 1875); Gulf of St. Lawrence (*Whiteaves*).

GENUS RAMPHONOTUS, Norman, 1894.

Type, *Ramphonotus minax* (Busk).

The zoœcia, if developed freely in form, are pyriform, widening upwards from the base, with a calcareous portion posterior to, and occupying a larger part of the front wall than that of, the membranous portion; the membranous portion of the area is nearly as wide as long, and often somewhat trifoliate in shape, the mouth-opening is simple and, as usual, close to its anterior margin; the border surrounding the membranous area is calcareous. There may be lateral spines. Oœcia large, globose, and imperforate. An acute bird's-beak-like avicularium mounted on a pedicel, with acute mandible of large size (often monstrously so), would seem to be habitually developed on the adult zoecium, situated on the central portion of the zoecium on, or immediately behind, the hinder margin of the area. [Zoarium incrusting in type species.] Pore-chambers: two pairs of lateral and one distal—the former very narrow and rarely extending beyond the side walls; the latter small and apparently sometimes not present.

38. *Ramphonotus minax* (Busk). (Pl. XIII. fig. 7.)

1867. *Membranipora Flemingii*, forma *minax*, Smitt, "Kritisk Förteckning, &c." p. 367, pl. xx. figs. 43, 44.

1880. *Membranipora princeps*, Hincks, Brit. Polyz., Introduction, p. lxxiii, woodcut xxxv.  
 1880. *Membranipora minax*, Hincks, Brit. Polyz., Introduction, p. lxxi, woodcut xxx. a, and p. 169, pl. xxii. figs. 2, 2 a-c.  
 1894. *Ramphonotus minax*, Norman, "A Month on the Trondhjem Fiord," Ann. & Mag. Nat. Hist. ser. 6, vol. xiii. p. 122.

Sværholt, East Finmark (*Nordgaard*). Specimens in my collection are from Shetland; Bergen and Trondhjem Fiords, Norway (*A. M. N.*); Gulf of St. Lawrence (*Whiteaves*). The specimens from the St. Lawrence have the zoëcia of very much larger size than those from the other localities.

It escaped my memory when I was writing my Trondhjem Fiord report that Hincks had, in the introduction to his work, called attention to the remarkable avicularium in this species, and had given the form in which the avicularium is fully developed a different specific name (*M. princeps*, see p. lxxiii, note); but a comparison of his woodcuts xxx. a and xxxv. will indicate, what is really the case, that the latter is only the more developed state of the former; and although on many polyzoaries only the first form will be found, the latter occurs both on Shetland and Norwegian specimens in my collection. The avicularia are very easily abraded in this species; and polyzoaries always have far more of the holes which indicate where avicularia have been than avicularia actually present (see Hincks, pl. xxii. fig. 2; no perfect avicularium is here shown).

#### DESCRIPTION OF PLATE XIII.

This Plate is chiefly occupied with figures of the backs of certain species in order to illustrate the pore-chambers. They must be regarded as in a great measure diagrammatic; for whereas in some species the pore-chambers are seen very easily, in other cases they are so hidden in the side walls that they are very difficult to observe.

Fig. 1. Pore-chambers of *Cauloramphus spinifer*.

2. " " *Callopora lineata*.
3. " " *Callopora craticula*.
4. " " *Ellisina levata*.
5. " " *Amphiblestrum Flemingii*.
6. " " *Amphiblestrum trifolium*.
7. " " *Ramphonotus minax*.
8. " " *Alderina solidula*; a young zoëcium at the edge of a zoarium.
9. Zoëcium of *Callopora Whiteavsii*, sp. n.
10. Zoëcium of *Callopora unicornis*, var. *armiifera*, Hincks, with the usual avicularia.
11. Zoëcium of the same, the last with gigantic avicularium on oëcium.
12. *Oochilina tensa*, sp. n.

LXXIX.—*Description of a new Fish of the Genus*  
*Chaetostomus from Venezuela.* By C. TATE REGAN, B.A.

*Chaetostomus anomalus.*

Head much depressed, without distinct ridges or prominences, its width equal to its length and about one third of the total (without caudal); snout with a naked swollen margin, without tentacles; fold of the upper lip without median prolongation; barbel very short. Eye very small, its diameter 8–12 times in the length of head,  $2\frac{3}{4}$ – $3\frac{3}{4}$  times in the interorbital width. Interoperculum with a few short spines. Thorax and abdomen entirely naked. D. I 7–9, longer than high, the anterior rays scarcely longer than the posterior and  $\frac{3}{5}$ – $\frac{2}{3}$  the length of head; adipose fin usually rudimentary or absent, rarely well developed but small. A. I 2–4, small. Pectoral spine barely reaching the root of the ventral. Caudal obliquely truncated. Scutes of body not keeled, with short marginal spines, about 26 in a longitudinal series. Olive-brown above, with light spots in some specimens; dorsal and caudal blackish, sometimes barred with rows of light spots.

Total length 160 millim.

Numerous examples from Merida, Venezuela, altitude 1500 metres, and from the Albirregas and Milla Rivers, above Merida, altitude 3500 metres, collected by Sr. S. Briceño.

This species is extremely remarkable in that the adipose fin is usually rudimentary or absent\*; its nearest ally is *Ch. microps*, Günther, which has a slightly larger eye, the head much less depressed, and the dorsal fin more elevated.

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LXXX.—*Description of a new Fish of the Genus Genypterus,*  
*with Notes on the Allied Species.* By C. TATE REGAN,  
B.A.

*Genypterus microstomus.*

Depth of body 8–10 times in total length, length of head about 5 times. Snout as long as or a little longer than eye,

\* Of 235 examples, 14 have a well-developed adipose dorsal, provided, as usual in this genus, with a spine, in 42 it is very small, in 78 more or less rudimentary, and in 101 entirely wanting. The great majority have I 8 dorsal and either I 3 or I 4 anal rays.

the diameter of which is  $4\frac{2}{3}$ – $5\frac{2}{3}$  times in the length of head, interorbital width 7–10 times. Maxillary extending to the vertical from posterior margin of eye, the width of its distal extremity about  $\frac{3}{4}$  the diameter of eye. Gill-rakers equal in length to  $\frac{1}{3}$ – $\frac{2}{3}$  the diameter of eye, 4 on lower part of anterior arch, succeeded by 4–6 rudiments. Dorsal commencing above middle of pectoral; pectoral about  $\frac{2}{5}$  the length of head; longest ventral ray nearly  $\frac{1}{2}$  the length of head. Scales present in the young on body and cheeks, none on opercles or upper surface of head; about 10 rows between anterior dorsal rays and lateral line; in the adult body naked, with rows of pits replacing scales. Yellowish, marbled with brown; vertical fins with a continuous broad brown longitudinal band and light margins.

Description based on three examples from Tasmania, Dunedin, and Stewart Island respectively, the largest 370 millim. in total length.

In all the other species of this genus the mouth extends to well beyond the vertical from the posterior margin of the eye. *G. australis*, Casteln., and *G. tigrinus*, Klunz., should be included in the synonymy of *G. blacodes*, Forst. In this species the depth of body is contained 7–8 times in the total length, the diameter of the eye 5–6 times in the length of the head, and the interorbital width about 8 times. There are 12–15 rows of scales between the dorsal fin and the lateral line, and the body is marbled with brownish. It is known from the coasts of Australia and New Zealand.

*G. capensis*, Smith, from the Cape of Good Hope, is closely allied to *G. blacodes*, but appears to have a much smaller eye; only stuffed specimens have been available for examination.

*G. chilensis*, Guichenot, from Chili, has a slightly smaller eye than *G. blacodes*, from which it also differs in colour, the back and sides being blackish, with a few irregular white spots. The British Museum possesses only one example, 580 millim. in total length.

*G. maculatus*, Tschudi, has been confused with *G. blacodes*, from which it is more easily distinguished than any other species. The short body (depth 6 times in the total length), small eye (diameter nearly 8 times in the length of head), broad interorbital space (width about  $5\frac{1}{2}$  times in the length of head), and few scales (8 or 9 rows between anterior dorsal rays and lateral line) at once distinguish this species. The British Museum possesses one example from Chili, 290 millim. in length, which agrees very well with Tschudi's description and figure, this latter being excellent.



LXXXI.—*Description of a new Fish of the Genus Arges from Venezuela.* By G. A. BOULENGER, F.R.S.*Arges orientalis.*

Head as broad as long or a little longer than broad, its length  $3\frac{2}{3}$  to 4 times in total length. Eye very small,  $\frac{1}{3}$  to  $\frac{1}{4}$  the width of the interocular space, midway between the anterior nostril and the posterior border of the head, a little nearer the upper extremity of the gill-cleft than to the posterior nostril, which is midway between the end of the snout and the eye. Four or five rows of præmaxillary teeth, the outer large, unicuspid, 15 to 20 in number; mandibular teeth bicuspid. Labial lobes large, with flat papillæ; width of the mouth about half that of the buccal disk; barbels  $\frac{1}{3}$  to  $\frac{2}{3}$  length of head; nasal flap not produced into a barbel. No trace of adipose fin. Dorsal I 5-6, the distance between its first ray and the root of the caudal  $1\frac{1}{3}$  to  $1\frac{1}{2}$  that between it and the end of the snout; first ray not prolonged, about half length of head. Outer pectoral ray about  $\frac{2}{3}$  length of head, feebly prolonged. Ventral fin originating slightly in advance of dorsal; the outer ray much thickened and a little prolonged, measuring  $\frac{1}{2}$  or  $\frac{2}{3}$  the distance between its base and the anal. Anal I 5-6; first ray about  $\frac{2}{3}$  the length of the ventral and halfway between the extremity of the latter and the root of the caudal. Caudal feebly emarginate, with the outer rays a little prolonged. Anal opening nearly equally distant from the extremity of the ventrals and the origin of the anal; males with a long anal papilla. Olive or yellowish above, more or less distinctly spotted or marbled with dark brown; caudal with dark spots; lower parts white.

Total length 80 millim.; without caudal 69; head 17; depth of body 11.

Numerous specimens from the Albirregas and Milla Rivers, above Merida, Venezuela, altitude 3500 metres, collected by Sr. S. Briceño.

This new species, the first *Arges* recorded from east of the Andes, is intermediate between *A. Whymperi*, Blgr., and *A. Tuczanowskii*, Blgr. It agrees with the first in the absence of an adipose fin, with the second in the unicuspid outer præmaxillary teeth. The relations of the eight known species are expressed by the following key, modified from that given in the 'Proceedings of the Zoological Society' for 1890 (p. 450):—

- A. First ventral ray about as long as its distance from the posterior extremity of the folded anal, reaching or nearly reaching anal opening.
- a. Barbel half length of head.
- Eye equally distant from posterior nostril and upper border of gill-opening, or a little nearer the former; outer pectoral ray not reaching beyond middle of outer ventral ray . . . . . 1. *prenadilla*, C. & V.
- Eye nearer upper border of gill-opening than posterior nostril; outer pectoral ray reaching nearly extremity of outer ventral ray . . . . . 2. *longifilis*, Stdr.
- b. Barbel  $\frac{1}{3}$  or  $\frac{1}{4}$  length of head; eye nearer upper border of gill-opening than posterior nostril . . . . . 3. *sabalo*, C. & V.
- B. First ventral ray as long as or a little longer than its distance from origin of anal, not reaching anal opening.
- a. No trace of adipose dorsal fin.
- Præmaxillary teeth nearly all bicuspid; barbel  $\frac{1}{2}$  length of head, which is  $4\frac{1}{2}$  to 5 times in total length . . . . . 4. *Whymperi*, Blgr.
- Outer præmaxillary teeth unicuspid; barbel  $\frac{1}{3}$  to  $\frac{2}{5}$  length of head, which is  $3\frac{2}{3}$  to 4 times in total length . . . . . 5. *orientalis*, Blgr.
- b. An elongate, low, adipose dorsal fin.
- Barbel  $\frac{1}{2}$  length of head; no nasal barbel . . . . . 6. *Taczanowskii*, Blgr.
- Barbel  $\frac{1}{3}$  length of head; no nasal barbel . . . . . 7. *peruanus*, Stdr.
- Barbel  $\frac{2}{3}$  to  $\frac{3}{4}$  length of head; nasal flap produced into a short barbel . . . . . 8. *Festæ*, Blgr.

LXXXII.—*Descriptions of new Genera and Species of New Zealand Coleoptera.* By Capt. T. BROUN, F.E.S.

[Continued from p. 458.]

Group **Feroniidae**.

*Trichosternus Walkeri*, sp. n.

*Glossy*, bronzed black, the margins of elytra and base of thorax viridescent; tarsi and palpi rufo-piceous, the tips of the latter paler.

*Head* broad, smooth, frontal impressions shallow. *Eyes* prominent. *Thorax* 3 lines broad,  $2\frac{1}{4}$  long; apex subtruncate, the sides moderately rounded and sinuously narrowed behind, posterior angles exactly rectangular; the dorsal groove does not reach the front, basal fossæ large. *Scutellum* striate at base. *Elytra* ovate-oblong, humeral angles dentiform, apical sinuosities well marked; they are striate, the punctuation of the striæ is fine but distinct, the interstices are most

convex behind, but become flattened towards the base, the third has three, the seventh five or six punctures.

*Femora* robust, intermediate *tibiæ* somewhat produced and compressed at the outer extremity. *Prosternum* with setæ. Apical *ventral segment* with two setigerous punctures at each side of the middle.

Its nearest ally is *T. Enysi*, no. 1334. In that species, however, the thorax is incurved in front, its sides are more sinuously narrowed behind the middle, the posterior angles are rather more acute, and the punctures of the elytral striæ are very much finer. Both species exhibit the same prolongation of the external apex of the middle tibiæ, a character which distinguishes them from the other species of this genus.

♂. Length  $9\frac{1}{2}$ , breadth  $3\frac{1}{2}$  lines.

Springfield, near Christchurch.

One example found by Mr. J. J. Walker, in whose honour it is named.

*Trichosternus akaroensis*, sp. n.

Brilliant black, hind body slightly viridescant; antennæ, palpi, and tarsi pitchy red.

*Head* smooth. *Eyes* prominent. *Antennæ* normal, the basal three joints glabrous, the first black. *Thorax*  $3\frac{1}{2}$  lines in breadth,  $2\frac{1}{2}$  in length, distinctly incurved in front, base medially emarginate; it is widest before the middle; the sides, however, are only moderately rounded and not much sinuate behind, posterior angles exactly rectangular; the dorsal furrow extends from the base, but becomes indistinct in front; basal fossæ moderate, situated midway between the median furrow and sides; along the base there are some feeble longitudinal lines and near the front a slight transversely curvate impression. *Elytra* ovate-oblong, subdepressed, rather broad and only moderately sinuous behind, humeral angles dentiform; distinctly punctate-striate, interstices slightly convex, the third with three or four, the fifth with two, the seventh with several punctures.

*Underside* black. Terminal ventral segment with two setigerous punctures on each side of the middle. *Prosternum* with setæ between the coxæ.

♀. Length  $11\frac{1}{2}$ , breadth  $4\frac{1}{8}$  lines.

Akaroa.

The male I have not seen, but the two females found by Mr. J. J. Walker, owing to their contour and sculpture, cannot very well be mistaken for any other species.

*Trichosternus bucolicus*, sp. n.

*Oblong*, moderately convex, shining viridi-æneous; legs and antennæ pitchy red, tips of the palpi paler, front margin of labrum red.

*Head* smooth, with the ordinary frontal impressions. *Eyes* prominent. *Thorax* subquadrate, 3 lines broad by  $2\frac{1}{4}$  long; apex arcuate-emarginate, base slightly notched; its widest part is just before the middle, behind that point it is slightly and gradually narrowed to the rectangular angles, anterior angles rounded; the dorsal furrow extends from base to apex, but becomes feeble in front, the fossæ are large, and the marginal channel is of uniform width until it comes in line with the fossæ, where it is expanded. *Elytra* ovate-oblong, shoulders dentiform, posterior sinuosities slight; their striæ are well marked, their punctuation, however, is very fine; the third and seventh interstices bear four or six punctures on each.

*Underside* glossy black, head viridescent, coxæ rufescent. Prosteronum setose at the tip. Ventral terminal segment with two pairs of setigerous punctures.

*T. hampdenensis* is the only similar species; it has, however, a rather broader head and thorax, the sides of the latter are more curvate; the elytra are more sinuously narrowed posteriorly, their striæ, though finely, are more distinctly punctated, and the interstitial sculpture differs.

♂. Length  $10\frac{1}{2}$ , breadth  $3\frac{3}{4}$  lines.

Stephen's Island.

Found by Mr. J. H. Lewis.

*Pterostichus Kirkianus*, sp. n.

*Nigrescent*, with reddish metallic reflections near the thoracic foveæ and on the elytra.

*Head* rather short, marked with numerous longitudinal striæ near the frontal impressions. *Eyes* prominent. *Thorax*  $2\frac{1}{4}$  lines long by 3 broad, basal and frontal margins evidently incurved, widest at the middle, its sides only moderately rounded, a little narrowed but scarcely sinuated behind, posterior angles rectangular; the discoidal groove nearly reaches the apex, the basal fossæ are large but not very broad, the disk is feebly transversely strigose, and the base bears longitudinal striæ. *Elytra* a good deal narrowed and sinuated apically, shoulders dentiform; their striæ are well marked and finely punctured, the interstices are moderately convex,



the third and seventh have from three to five punctures on each. Terminal ventral segment with two setigerous punctures on each side of the middle.

Belongs to the numerously represented section having the facies of *Trichosternus*, but lacking the prosternal setæ of that genus. After a careful comparison with the existing species, I find that no. 1640—*P. deceptus*—most nearly resembles this. The form and coloration differ, whilst the narrower and more apically attenuated hind body distinguishes it from *P. deceptus*.

♂. Length  $10\frac{1}{2}$ , breadth  $3\frac{3}{8}$  lines.

Stewart Island.

Named after the late Professor Kirk, from whom I received it.

*Pterostichus memes*, sp. n.

*Oblong*, moderately convex, nitid, nigrescent, viridi-æneous above; legs and antennæ nigro-piceous, terminal joints of the latter and the tips of the palpi rufescent.

*Head* narrower than thorax, frontal foveæ elongate. *Eyes* prominent. *Thorax*  $2\frac{1}{4}$  lines in length by  $2\frac{7}{8}$  in breadth, its sides well rounded, moderately sinuated towards the rectangular posterior angles, lateral margins and channels well developed, these latter somewhat expanded behind, apex arcuate-emarginate, base medially emarginate; dorsal furrow well marked and almost touching the apex; the basal fossæ are large and there is a slight impression between them. *Scutellum* striate at base. *Elytra* rather wider than thorax at the base, with dentiform shoulders; they are oblong-oval, and, though a good deal narrowed, are only moderately sinuated apically; their striæ are broad, deep, and regular, and are distinctly yet finely punctured; the interstices are convex, the third has three and the seventh four punctures.

There are two setæ near each eye, the same number on each side of the thorax, and four at the extremity of the last ventral segment in both sexes.

*Femora* dilated, the anterior most strongly and grooved underneath.

This belongs to the *Trichosternus*-like section. *P. Fultoni* is the nearest species, but the sides of its thorax are much less rounded, its legs and antennæ are more rufescent, and the elytral interstices are decidedly less convex. *Trichosternus sylvius*, Bates, is also somewhat similar, but its hind body is rather narrower and more oval and the interstices are less convex.

The female is differentiated by its slightly narrower form and flatter interstices.

♂. Length  $9\frac{1}{2}$ , breadth  $3\frac{1}{2}$  lines.

Maniototo Plains.

One of each sex sent by Mr. J. H. Lewis.

*Pterostichus prasinis*, sp. n.

*Oblong*, shining, black, feebly rufescent; palpi pitchy red; tarsi rufo-piceous.

*Head* broadly oviform, frontal impressions rather short. *Eyes* prominent. *Antennæ* reach the base of thorax, joints 4-11 reddish and pubescent. *Thorax*  $2\frac{3}{8}$  lines broad by 2 long, apex widely, the base medially emarginate; its greatest width is rather before the middle, where the sides are moderately rounded, they are gradually narrowed behind and have a slight sinuation near each rectangular posterior angle; the lateral margins and channels are well developed throughout, the discoidal groove extends from base to apex or almost so, and the basal fossæ are well marked. *Scutellum* estriate. *Elytra* oblong-oval, of about the same breadth near the apical sinuosities as they are at the slightly dentiform shoulders; they have deep regular striæ, but their punctuation is indistinct or obsolete; the interstices are slightly convex and simple. *Legs* normal; femora moderately dilated medially.

This must be placed in the section having two setæ on each side of the thorax. The male has one seta at each side of the middle at the apex of the last ventral segment; the female has two.

*P. procerulus* is the only member of the section at all like this species, but the form of its thorax is materially different; the sides, though narrowed, are straight behind, the basal fossæ are more shallow, they are situated nearer the middle, and there is a smaller impression near each angle; the elytral striæ are thinner and their fine punctures are more apparent.

Length 9, breadth  $2\frac{7}{8}$  lines.

Westport.

One pair, found by Mr. J. J. Walker.

*Pterostichus setiventris*, sp. n.

*Elongate*, subplanate, moderately glossy, black; legs and antennæ rufo-piceous, mandibles and palpi pitchy red.

*Head* rather narrow, with elongated frontal impressions, the genæ much swollen behind and below the eyes. *Thorax* feebly arcuate in front,  $2\frac{1}{8}$  lines long by  $2\frac{1}{2}$  broad, its base emarginate at the middle, the sides are very little rounded, so

that they are hardly appreciably broader near the front than at the base; the posterior angles are rectangular and only very slightly projecting; the well-marked central groove barely attains the base or apex, the basal fossæ are large and deep and there is a smaller one near each angle; the longitudinal impressions at the base and the transversal discoidal ones are quite faint. *Scutellum* striate at base. *Elytra* oblong, moderately sinuated posteriorly; the apical portion, however, appears broad, humeral angles dentiform; their sculpture consists of irregularly interrupted striæ, which become coarser and more confused towards the extremity. *Femora* dilated, the hind pair most strongly, so as to be subangulate below. The *prosternal process* is canaliculate, the flanks are closely yet finely punctured, the mesosternum more densely.

This is another member of the section with four setæ at each side of the thorax. *P. irregularis* is nearly related; it has, however, distinct rugæ on the head, a rather longer thorax, much broader elytral impressions, and acutely dentiform posterior femora. *P. Lewisi* is also similar as regards elytral sculpture, but the thorax is obviously longer and the antennæ are more slender and shorter. In Sharp's *P. myrmidon* the basal joint of the antenna is thinner and slightly longer, the eyes are smooth and embedded, so as to seem exactly continuous with the genæ (which is not the case in *P. setiventris*, as the eyes are slightly prominent and faceted), its thorax is more contracted behind, the elytra are more oviform, more strongly sinuated and narrowed posteriorly, and their sculpture is different.

In the males of these species there are two setigerous punctures on each side of the middle at the apex of the last ventral segment; these are also present in *P. setiventris*, but, in addition thereto, there are four others on the middle of that segment, and as these last do not occur in the species now adverted to, they form a distinctive character.

♂. Length 9, breadth 3 lines.

Westport.

One example from Mr. J. J. Walker's collection.

### Group Harpalidæ.

#### ALLOCINOPUS, gen. nov.

*Mentum* deeply emarginate, its tooth entire and bisetose at base. *Palpi* elongate, their terminal articulations not quite oviform, truncate at extremity; intermediate joint of the labial with four setæ. *Head* large, epistome straight and

with one setigerous puncture near each front angle, its basal suture simple and rather fine. *Labrum* quadrate, only slightly emarginate, quadrisetose. *Eyes* large, only moderately convex, distant from thorax. *Antennæ* slender, reaching backwards to base of thorax, their first two joints and the basal portion of the third glabrous, the others pubescent; second joint nearly as long as first, but shorter than third. *Tibiæ* setose, the anterior with strong apical spurs, the others bicalcarate. *Tarsi*, anterior with triangular basal joints, 2-4 widely dilated, quite transverse, fourth very short, deeply excavate at the extremity, but only feebly lobate; basal joints of the intermediate longer than those of the front pair, 2-4 also rather longer, second joint cordate; posterior slender, simple. *Thorax* transverse, cordate-quadrate, base truncate and resting on the elytra; there is a single seta on each side before the middle. *Scutellum* short. *Elytra* oblong, much narrowed, yet only slightly sinuated, posteriorly; apices rounded.

This is unlike our other genera. In the structure of the tarsi it approximates *Triplosarus*; there, however, the resemblance ends. The large head, with the eyes placed much in advance of those of *Euthenarus*, *Hypharpax*, and *Lecanomerus*, and the posteriorly attenuate hind body, together with the dense squamiform or spongy vestiture of the soles of the front tarsi, are distinctive.

*Allocinopus sculpticollis*, sp. n.

*Oblong*, slightly convex, moderately nitid, nigrescent; legs, antennæ, and palpi testaceous.

*Head* rather longer than thorax and almost as broad in its widest part as that is, with some feeble linear sculpture on the epistome; the frontal foveæ are small and are situated a little further forward than the eyes; there is a single puncture in line with the middle of each eye. *Mandibles* stout, moderately long, curved at apex, pitchy red. *Thorax* 1 line long by  $1\frac{1}{2}$  broad, widest just before the middle, widely sinuate or narrowed behind, posterior angles rectangular and a little obtuse, apex widely and slightly incurved, lateral margins and channels well developed; the dorsal groove extends from the base, but does not attain the front; the basal fossæ are rather shallow and elongate and are placed halfway between the middle and sides; there are some indistinct transverse striolæ on the disk, and the slightly flattened area extending along each side from the middle to the base is finely punctured; the surface is densely but minutely sculptured



throughout, but to the eye appears smooth. *Elytra* slightly wider near the hind femora than elsewhere; their sides, however, are only a little rounded; the shoulders are evidently broader than the base of the thorax, but are not prominent; their simple striae are well marked throughout, the first and second near the base are confluent, there is a small puncture on each of the third interstices in line with the hind thighs, and the marginal punctures become confused towards the apices. Posterior *tibiae* straight.

The last *ventral segment* is much longer than the preceding one; it is obliquely narrowed apically for about half of its length, and, just where the contraction begins, there is a denticle at each side; there are two setigerous punctures at the apex.

Length  $5\frac{3}{4}$ , breadth  $1\frac{1}{2}$  lines.

Motueka River.

Described from a specimen forwarded by Mr. J. H. Lewis, who states that he received it from Mr. G. V. Hudson, of Wellington.

### Group Pogonidæ.

#### OöPTERUS, White.

The following details are characteristic of this genus:—

*Palpi* moderately elongate; terminal joints thick at the base and very gradually tapering towards the acuminate extremity; the penultimate quite as long, slender at the base, and dilated towards the apex. *Tarsi* with the basal two joints dilated, the first oblong, second cordate, both acutely prolonged at the inner angle. *Antennæ* elongate, the basal two joints and the basal portion of the third glabrous. *Head* with two erect setæ near each eye and two on the forehead. *Thorax* with one lateral seta before the middle and another at each posterior angle.

#### *Oöpterus latipennis*, sp. n.

*Shining*, piceous; the antennæ, palpi, and legs fusco-testaceous, the margins of the elytra and an ill-defined apical space on each of nearly similar colour.

*Head* with large lateral impressions. *Eyes* not prominent. *Antennæ* elongate, their second joint nearly as long as the following one. *Thorax* nearly one third broader than long, apex widely but not deeply incurved; it is widest near the middle and a good deal narrowed behind; posterior angles acute and slightly projecting; dorsal furrow well marked, but

not reaching the front margin; basal fossæ large and separated from the sides by an almost carinate space; the basal region is more or less finely but not closely punctate. *Elytra* broadly oval, nearly twice the breadth of the thorax, distinctly marginate, shoulders rounded; they are finely punctate-striate, the sutural striæ are the deepest and attain the apices, the second and third are moderately distinct at the base but are abbreviated behind, the lateral and apical sculpture are somewhat obsolete, but the subapical carinæ are distinct; on the third interstices there are three punctures; these, however, are so placed as to appear to be merely enlarged punctures of the striæ.

♀. Length  $2\frac{3}{8}$ , breadth  $1\frac{1}{8}$  lines.

Westport.

I am indebted to Mr. J. J. Walker for my specimen.

*Oöpterus probus*, sp. n.

*Glossy*, fusco-piceous; legs, palpi, and a large apical space on each elytron clear testaceous, the antennæ infusate.

*Thorax* distinctly incurved in front,  $\frac{5}{8}$  of a line broad by  $\frac{1}{2}$  long, rather wider just before the middle than it is elsewhere. *Elytra* quite oval, the four inner striæ on each are well marked and punctured, the sutural only reaches the extremity, the fifth and sixth assume the form of series of punctures, and the posterior carina is distinct.

When compared with *O. latipennis* this species appears more brightly coloured. The thorax is less transverse, the anterior angles are more rounded, the basal fossæ and sculpture are similar, but the median groove extends to the basal margin and the apex is more emarginate. The hind body is not so broad, its sculpture is deeper, but there are no interstitial punctures.

Length  $2\frac{1}{4}$ , breadth  $\frac{7}{8}$  line.

Westport.

One example found by Mr. J. J. Walker.

*Oöpterus parvulus*, sp. n.

*Convex*, nitid, fuscous; the sides of the thorax and elytra, as well as the apical portion of the latter, testaceous; the legs, palpi, and basal two joints of the antennæ also yellowish.

*Head* with distinct interocular impressions. *Eyes* moderately large, but not prominent. *Thorax* about as long as it is broad, cordiform, widest near the middle, posterior angles slightly projecting, base and apex subtruncate; the dorsal

groove does not reach the front margin, the basal foveæ are well marked, and there are a few scattered punctures intervening. *Elytra* oval, with distinct sutural striæ; the sculpture beyond these appears in certain lights to consist of feebly impressed striæ with well-marked punctures, which, however, become obliterated posteriorly; the usual apical plicæ are not well developed.

♂. Length  $1\frac{3}{4}$ , breadth  $\frac{5}{8}$  line.

Westport.

Two males of this rather pretty little species were found by Mr. J. J. Walker.

### Group Bembidiidæ.

#### *Bembidium actuarium*, sp. n.

*Elongate-ovate*, subdepressed, glossy, greenish or bluish black; legs flavo-testaceous; the tarsi and first antennal joint testaceous, the remaining joints and the palpi infusate.

*Head* oviform, with well-marked interocular furrows. *Eyes* large. *Thorax* of almost equal length and breadth, rounded laterally and rather deeply incurved behind, posterior angles acutely prominent, base and apex straight, the sides well margined; its surface is moderately convex, but the basal region is somewhat depressed; the fossæ are deep, narrow, and close to the angles, so that the margins appear slightly carinate there; the median furrow, distinct behind, hardly attains the apex. *Elytra* subdepressed, oviform, a good deal narrowed posteriorly, shoulders rounded; obviously punctate-striate, the sixth ends near the middle and is represented by distinct serial punctures; the fifth also is abbreviated; the sutural reaches the apex, but the punctures cease at the hind slope, which seems quite smooth owing to the intermediate striæ being obsolete there; there are no well-marked interstitial punctures. *Tarsi* elongate, basal two joints of the anterior only moderately dilated.

*B. orbiferum*, though nearly similar in coloration, is much more robust and convex. *B. parviceps*, perhaps, most nearly resembles this species, which, however, may be separated by the projecting thoracic angles, more attenuated hind body, and yellow legs.

♂. Length 2, breadth  $\frac{3}{4}$  line.

Pipiriki, Wanganui River.

I am indebted to Mr. G. V. Hudson for this and several other interesting species.

Group *Pericalidæ*.*Scopodes viridis*, sp. n.

*Body* depressed, shining, bronzed green; legs and antennæ nigrescent.

*Head* densely longitudinally strigose. *Eyes* very large and prominent. *Thorax* rather broader than long, widest just before the middle, but not distinctly dentiform there, gradually narrowed behind; the lateral margins moderately developed, less so towards the base, where they are slightly turned inwards, without, however, forming any distinct angle; discoidal sculpture dense, transverse, almost shagreen, median furrow abbreviated. *Scutellum* closely sculptured. *Elytra* oblong, widest behind the middle, humeral angles rounded, apices obliquely truncate, the parts nearest the suture slightly rounded; their striæ rather shallow and not very sharply defined, the three feebly impressed punctures on the third interstices are indicated by a bluish tinge.

This pretty little species may be readily identified by its coloration. No. 1342 (*S. venustus*) may be considered the nearest ally; it is, however, nearly twice as large.

♀. Length 2, breadth  $\frac{2}{3}$  line.

Ida Valley.

I am indebted to Mr. J. H. Lewis for my specimen.

Group *Hydrophilidæ*.*Rygmodes nigripennis*, sp. n.

*Oval*, rather narrow, moderately convex, shining, black; antennæ rufo-piceous, the claws and tibial spurs somewhat castaneous.

*Head* closely and distinctly punctured; epistome with raised frontal and lateral margins. *Thorax* transverse, of the usual form; on the middle its sculpture is rather finer than that of the head, but at the sides the punctures are closer and more distinct. *Scutellum* elongate and smooth. *Elytra* finely punctured over their whole surface; the striæ are fairly well marked behind and near the suture, but are obsolete near the base; these striæ in some places are punctate; rather fine serial punctures appear where the grooves are wanting, and the interstices, especially those on the basal half, are rather flat.

This species is hardly so convex as *R. puncticeps*, and it is somewhat narrower. The palpi are stouter, with the intermediate joints rufescent at the tips. The sides of the thorax are a little more curvate and the scutellum is narrow and



cuneiform. *R. ovalis* (no. 1823) differs in coloration, and the thoracic sculpture, instead of being "the same on the disk as it is at the sides," is in the present species more distinct at the sides.

Length  $3\frac{1}{4}$ , breadth  $1\frac{1}{2}$  lines.

Otira Gorge.

One found by Mr. T. F. Cheeseman many years ago

CYLOMISSUS, gen. nov.

*Palpi* as long as the antennæ, penultimate joint somewhat curvate and thickened towards the extremity, the terminal narrower and distinctly shorter. *Antennæ* 9-articulate, first joint hardly twice the length of the second; third half as long as the preceding one, transverse, yet twice the length of the fourth; fifth quadrate, sixth transverse, slender at base; club opaque, basal joint conical, second quadrate, third oviform. *Femora* nude, minutely punctate, apparently smooth and shining underneath. Anterior *tibiæ* with stout apical hooks and fringed with minute spines, the middle and hind pairs distinctly spinose. Posterior *tarsi* with minute basal joints, second and fifth equally long; intermediate joints longer than broad, claws well developed; the soles with yellow pubescence.

*Labrum* short, emarginate. *Epistome* slightly incurved. *Eyes* not prominent, minutely faceted. *Mentum* quadrate. *Prosternum* simple; front coxæ prominent and contiguous. *Mesosternum* simple.

More oblong than *Cyloma*, with longer palpi, differently formed antennæ, and without the mesosternal process of that genus.

*Cylomissus glabratus*, sp. n.

*Body* glabrous, oblong, transversely convex, shining, nigropiceous; sides of thorax broadly banded with infusate red, the sides and posterior part of elytra irregularly tinged with red; legs pitchy red; antennæ pallid, sixth joint infusate; club large, dull fuscous, minutely pubescent.

*Head* finely punctate, rather smooth in front. *Thorax* transverse, its sides finely margined and rounded, with obtuse angles, apex incurved; the surface rather distinctly yet finely punctured. *Scutellum* elongate, smooth. *Elytra* oblong, transversely convex, each with nine series of distinct punctures which almost form striæ, the interstices simple, impunctate.

Length  $2\frac{1}{2}$ , breadth  $1\frac{1}{2}$  lines.

Westport.

One from Mr. J. J. Walker's collection.

## ZEADOLOPUS, gen. nov.

*Body* compact, convex, short, oviform. *Palpi* short, terminal joint oblong. *Antennæ* 10-articulate, inserted below the angles of the forehead; their basal two joints stout and almost equal, third rather longer than broad, slender at base, the following three short, sixth quite transverse; club large, with four transverse joints. *Head* transversely quadrate, almost truncate, and finely margined in front. *Eyes* moderately large, rather flat, distant from thorax. *Labrum* exposed and notched. *Thorax* broader than long, closely adapted to base of elytra, its sides finely margined and but little curved, apex widely but not deeply emarginate. *Scutellum* large, triangular. *Elytra* short, not striate. *Legs* short. *Tibiæ* broad, the anterior with distinct spurs, the others with straight apical calcars. *Tarsi* 5-jointed, the basal four compact and nearly equal, fifth longer than the preceding two taken together in the front pairs, but, owing to the longer intermediate joints, the last joint of the posterior seems shorter; they are finely pubescent; claws slender.

The antennal structure might seem to exclude this genus from the Hydrophilidæ, but in habit, general appearance, armature of tibiæ, and tarsal structure it is like other genera of the family, and should, I think, be located near *Tormus* and *Adolopus*.

*Zeadolopus spinipes*, sp. n.

*Convex*, broadly oval, nitid, glabrous, rufo-piceous; palpi and antennæ testaceous; club opaque, fuscous, densely and finely pubescent; legs reddish.

*Head* moderately finely and not closely punctured, nearly smooth behind. *Thorax* with very fine and rather distant punctures on the disk, but becoming closer towards the sides. *Elytra* not striate, but with series of distinct punctures, which, however, become more or less obsolete on the paler posterior portion, where there are fine sutural striæ; interstices broad, with some small punctures on the basal half.

*Tibiæ* broad, the anterior with four or five slender spines along their outer edge, the intermediate with more prominent ones.

Length 1, breadth  $\frac{3}{4}$  line.

Westport.

Unfortunately one mounted specimen only is available, so that the lower surface could not be satisfactorily examined. It is from Mr. J. J. Walker's collection.

Group *Oxytelidæ*.

*Trogophlæus maritimus*, sp. n.

*Subparallel*, slightly shining, sparsely clothed with pale yellowish pubescence; head and abdomen fuscous; thorax and elytra castaneous, these latter with a large apical space on each, sometimes occupying nearly half of the surface, testaceous; antennæ and legs flavo-castaneous, the basal three joints of the former and the mandibles more rufescent.

*Antennæ* inserted below distinct prominences in front of the eyes; first joint stout and equal in length to the following two conjointly; second and third of almost equal length, fourth slightly shorter than the contiguous ones, eighth and ninth moniliform, tenth subquadrate, eleventh conical. *Mandibles* curvate, inwardly dentate. *Palpi* moderately elongate, penultimate articulation incrassate and finely pubescent, terminal very short and narrow.

*Head* trigonal, rounded behind, rather finely and closely punctate. *Eyes* globular, only slightly convex, distinctly faceted. *Thorax* just about as long as broad, widest before the middle, rounded laterally, more narrowed behind than in front; it is closely and finely punctured, but does not exhibit any well-marked impressions. *Elytra* quadrate, incurved at base, apices truncate; the suture is a little elevated, the sculpture on the dark portion is like that of the thorax, but becomes finer on the pale parts. *Abdomen* elongate, with strongly elevated lateral margins, it is very finely punctured, and bears slender elongate pubescence. *Legs* pilose, tibiæ simple; terminal joint of the tarsi nearly twice as long as the basal two taken together, claws thickened at base.

*Underside* fuscous; coxæ pale chestnut.

*Var.*—Body longer, the thorax so regularly rounded that the middle appears widest; the posterior portion of the elytra darker, yet quite evidently paler than the basal half.

Length  $1\frac{3}{4}$ , breadth nearly  $\frac{1}{2}$  line.

Mokohinou Island.

Three examples from Mr. Sandager.

Group *Lucanidæ*.

*Lissotes auriculatus*, sp. n.

*Robust*, subopaque, fuscous black, sparsely setose.

*Head* large, slightly exceeding the thorax in length; its frontal portion slopes downwards, and appears curvedly depressed there, its anterior margin is slightly incurved medially;

at each side behind the eye it has an angular lobe which projects quite as far as the lateral margin of the thorax, this causes the head to appear constricted behind that point; its surface is moderately finely punctured; the punctuation, however, becomes finer and more distant towards the middle of the base. *Thorax*  $2\frac{1}{2}$  lines long by 5 broad, apex widely but slightly emarginate; the lateral margins are thick and somewhat reflexed, but become obsolete near the rounded front angles; the sides are almost straight, but near the base are obliquely and rather abruptly narrowed, so that the posterior angles are not at all well marked; the base is almost quite truncate; its punctuation is rather coarser than that of the head, but becomes finer and more remote towards the front. *Elytra* narrower than thorax, rounded behind, humeral angles nearly rectangular; their side margins are like those of the thorax; their sculpture consists of irregular, moderately close, and coarse punctures, and two or three ill-defined linear elevations on each.

*Tibiae* hispid, the anterior with a stout inner calcar reaching the extremity of the third tarsal joint, the external apex bidentate; the intermediate obviously angulate outwardly and with a small median tooth; the posterior triangulate at the extremity and grooved along the hind face.

*Mandibles* large, curvate, bifid at apex; near the base on each there is a short angular tooth just below the level of the labrum; at the middle on the inside of each mandible there is a large tooth, directed upwards, which is bifid at the apex, and near the front on the lower surface there is a short angular projection; none of these inner teeth touch the corresponding ones when the mandibles are closed.

*Underside* rather finely punctured.

The form of the male is like that of *L. ithaginis* (no. 1966). The mandibles differ materially from those of that species and *L. Helmsi*, and the lobe-like projection behind each eye does not occur in any other species known to me. ♀ incog.

♂. Length  $11\frac{1}{2}$ , breadth  $5\frac{1}{4}$  lines.

Thames.

Described from two males kindly sent to me some time ago by Mr. R. Curtis.

*Mitophyllus comognathus*, sp. n.

*Oblong*, moderately convex, slightly nitid, piceous; sparingly clothed with narrow, depressed, pallid scales.

*Head* rather broad, almost truncate in front, but with an angular projection at each side over the spot where the



antenna is inserted; the middle of the forehead smooth, the rest of the surface moderately coarsely punctured. *Mandibles* prominent, curvate, tridentate at extremity; along the inside they bear many outstanding slender fuscous setæ similar to those on the basal joint of the antennæ. *Eyes* but little prominent. *Antennæ* pitchy red, the basal joint slightly curved and nearly as long as the following six taken together, second stout and moniliform, 3-6 short, seventh slightly produced in front; club with three elongate almost equal joints, each fringed with fine erect pubescence. *Thorax* transverse, wider behind than in front, its sides rounded; posterior angles nearly rectangular but not at all projecting, base bisinuate; its surface moderately coarsely but not closely punctured; the central longitudinal space, however, is smooth. *Elytra* oblong, with ill-defined sutural striæ, their punctuation like that of the thorax, but closer.

*Tibiæ* sparsely clothed, the anterior slightly curved, their outer edge crenate; the inner terminal calcar is straight, the external is prominent and curved, near the middle there is the usual dentiform projection; the middle and hind tibiæ are straight, the former have a small median tooth on each, but the posterior are unarmed.

*Underside* piceous; abdomen with fine grey setæ, the punctuation coarse and disposed in transverse series; metasternum convex, canaliculate in the middle, its flanks rather coarsely punctured and clothed with elongate greyish scales.

Allied to *M. macrocerus*, but the head is much broader, especially in front, and the antennal club is very much shorter. The mandibles most nearly resemble those of *Lissotes Helmsi* in form.

♂. Length  $3\frac{1}{2}$ , breadth  $1\frac{3}{8}$  lines.

Westport.

This is another of Mr. J. J. Walker's discoveries.

### Group *Pycnomeridæ*.

#### *Pycnomerus nitiventris*, sp. n.

*Subparallel*, elongate, nude, opaque, piceous; legs pitchy red; antennæ darker.

*Head* distinctly punctate, more finely in front, the lateral elevations before the eyes well developed, but the intervening impressions are slight. *Eyes* convex. *Thorax* one third longer than broad, apex truncate, base slightly rounded, lateral margins narrow; the sides are nearly straight, but a little narrowed behind and in front; anterior angles rectangular, the posterior not at all prominent; its surface is

moderately coarsely and closely punctured, except on a narrow smooth space behind the middle, which has at each side of it a shallow longitudinal impression. *Scutellum* distinct. *Elytra* punctate-striate; the sutural striæ are deepest near the apices, where the margins are somewhat raised and thickened; interstices moderately broad, humeral angles obtuse. *Antennæ* sparingly and minutely pubescent, terminal joint of each evidently smaller than the tenth.

*Underside* piceous, punctate, the metasternum with a longitudinal impression behind, abdomen less closely punctured and quite shining.

This is obviously narrower than *P. sophoræ*; it has not the same thickened thoracic margins, the hind angles are different, the shoulders are rounded and not in the least prominent, the elytral striæ and their punctures are much finer, and the interstices are much broader. *P. longulus*, which I have not seen, is smaller, the thorax differs, and the body is shining; it is, no doubt, the nearest ally.

Length 2, breadth  $\frac{1}{2}$  line.

Westport.

Two examples from Mr. J. J. Walker's collection.

*Bothrideres picipes*, sp. n.

*Elongate*, subopaque, black; antennæ and tarsi red, legs piceous; sparingly clothed with minute brassy setæ.

*Head* distinctly and closely punctured, with obsolete inter-antennal impressions. *Eyes* very prominent. *Thorax* subquadrate, with a depression close to each anterior angle, its sides nearly straight but sinuate behind; posterior angles rectangular, with a punctiform fovea near each; the punctuation of the disk is rather coarse, it becomes finer in front and closer towards the sides; there is an elongated fovea, but no other well-marked impression. *Scutellum* nearly triangular. *Elytra* rather wider near the middle than elsewhere, shoulders elevated and rufescent; their striæ are well marked and finely punctured, the interstices are smooth on some parts but finely punctured on others; the suture and alternate interstices become cariniform behind.

*B. cognatus*, Sharp, may be easily recognized by the ferruginous elytra and legs. *B. mæstus* is rather broader, with different thoracic sculpture, whilst *B. obsoletus* may be distinguished almost at a glance.

Length 2, breadth  $\frac{5}{8}$  line.

Picton.

One specimen from Mr. J. J. Walker's collection.

[To be continued.]

LXXXIII.—*The Systematic Position of the Genus*  
*Hadrotarsus*, Thorell. By R. I. Pocock.

THE type of the genus *Gmogala*, Keys., namely *G. scarabæus*, Keys., from Sydney, is in the British Museum. It was described in 1890 in the last part of L. Koch's work on the spiders of Australia. The description is defective in many points, erroneous in others. Hence I offer the following supplementary remarks on this interesting little genus\*.

Simon (Hist. Nat. Araignées, i. pp. 305–307, 1892) rightly surmised that the type of *Gmogala* was related to that of *Hadrotarsus*, Thor. On the strength of Keyserling's description of *Gmogala scarabæus* he kept the two genera distinct, but united them in the family Hadrotarsidæ. In my opinion there is no doubt that the two genera are identical.

In *Gmogala scarabæus*, as in *Hadrotarsus babirusa*, the eyes of the anterior line are procurved, the medians being considerably larger than the laterals. Keyserling erroneously describes the anterior eye-line as recurved, with the medians smaller than the laterals. His figure and description of those of the posterior line are approximately correct. The clypeus is high and its inferior edge overhangs the base of the mandibles. The latter are vertical, not convex in front, with their inner edges obliquely diverging externally from near the base; the fangs are long, arcuate, lying transversely and crossing each other in the middle line. The labium is triangular, wider than long. The maxillæ are oblique and meet in front of the labium, their inner extremities being membranous and pellucid. This pellucid area was apparently overlooked by Keyserling, who represents the maxillæ as widely separated in the middle line. The sternum is very wide and convex, and projects between the posterior coxæ, which are widely separated. The metasternite is thickly chitinized and relatively large. Similarly the dorsal sclerite of the pedicel is thickly chitinized. The anterior extremity of the abdomen forms a circular rim above and below the pedicel. The dorsal scute does not extend to the posterior end of the abdomen, four transversely arched integumental folds intervening between it and the anal tubercle. These folds are continuous with the longitudinal folds that run along the sides of the abdomen between the dorsal and

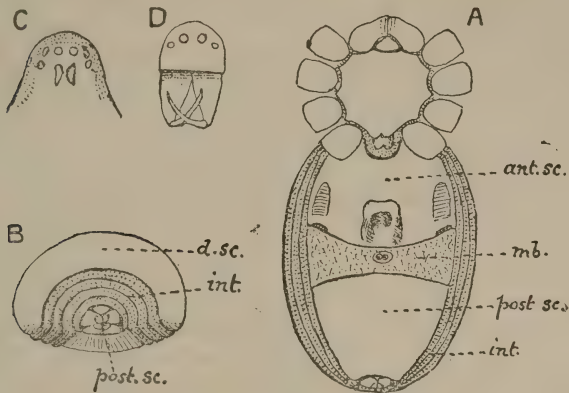
\* Having only one specimen for examination I was unable to determine certain important structural features, notably the dentition of the mandibles, the structure of the sclerites of the pedicel, &c.

ventral sclerites. The ventral sclerites are two in number and subequal in length; they are separated from each other by a transverse band of thick membrane. The anterior sclerite extends forwards to the pedicle. In front of its posterior border in the middle line is the very distinct epigyne; the lung-sacs lie at its sides, their spiracles being upon its postero-lateral angles. The tracheal spiracles are situated in the middle of the membranous band; they appear as a pair of contiguous round dark spots, surrounded by a circular rim. The posterior plate is narrowed behind and extends back to the spinners. The four visible spinners form with the anal tubercle a compact cluster at the extreme posterior end of the abdomen.

Simon placed the Hadrotarsidæ provisionally between the Oonopidæ and Dysderidæ, but the well-developed epigyne serves to separate them entirely from the neighbourhood of these families and to place them amongst the cribellate entelegynous forms. Simon also points out that they have "des rapports très sérieux" with certain Theridiidæ, notably with *Pholcomma*, but more especially with *Paculla* and *Tetrablemma*. *Hadrotarsus* has the high clypeus, the conical cluster of spinners, &c. of the Theridiidæ, the broad sternum, triangular labium, obliquely inclined maxillæ, strong attenuate mandibles with long slender arched fangs, and the long tarsi described by Simon as typical of the Pacullæ (*loc. cit.* p. 570). Moreover, the irregular shape and general appearance of the posterior median eyes in *Hadrotarsus* suggest that these organs are in process of atrophy. Were the obliteration to be completed, the remaining six eyes would not differ greatly from the six eyes of *Paculla*. As for the abdomen, in the presence of the large dorsal scute, of the lateral and posterior integumental folds, and of the ventral scutes it is almost identical with that described and figured by Simon as seen in *Tetrablemma* (*loc. cit.* p. 3, fig. 5, and p. 571, fig. 584), except that the integumental folds are not strengthened with chitinous bands (erroneously compared by Simon with the tergal plates of *Liphistius*), and the posterior ventral plate is relatively larger and undivided. Simon was not able to determine with certainty the position of the spiracles in *Tetrablemma* and *Paculla*, but supposed them to open upon the posterior border of the anterior ventral scute, where they are placed, in fact, in *Hadrotarsus*. Cambridge, however, described the spiracles in *Tetrablemma* as situated close together towards the middle of the ventral surface behind the anterior scute (P. Z. S. 1873, pl. xii. fig. 1 c, p. 115). However that may



be, the known facts justify, in my opinion, the union of *Hadrotarsus* with the *Paculleæ*.



*Hadrotarsus scarabæus* (Keys.).

- A. Ventral view of trunk, showing the anterior scute (*ant.sc.*) of the abdomen, with the epigyne and lung-sacs, the membranous band (*mb.*) with the approximated median tracheal spiracles, the posterior scute (*post.sc.*), and the lateral integumental folds (*int.*).  
 B. Posterior extremity of abdomen from behind, showing the dorsal scute (*d.sc.*), the integumental folds (*int.*), and the posterior ventral scute (*post.sc.*) with the cluster of spinners and the anal tubercle above it.  
 C. Anterior end of carapace from above, showing the eyes.  
 D. Face, showing eyes of anterior line, high clypeus, and mandibles with long crossing fangs.

#### LXXXIV.—A new Clasping-organ in a Centipede.

By R. I. Pocock.

THE African and Oriental Scolopendroid genus *Otostigmus* is represented in the Neotropical Region by a series of species for which I have proposed the name *Parotostigmus*. In certain species of this genus the males are furnished with a pair of movable processes, varying in shape according to the species and arising one on each side from the inner surface of the femur of the legs of the posterior pair. The first species to be described with this peculiarity was *P. scabricauda*, Sauss., from Rio Janeiro. In 1879 Kohlrausch recorded *P. scabricauda* from Popayan in Colombia, and, following him, I referred to this species specimens from

Machachi and Corazon in Ecuador\*. Subsequently Brölemann† identified it from Guatemala. This author has also described a species with a somewhat similar modification of the anal legs from Venezuela and Brazil, naming it *Otostigmus Goeldii*.

Within the last few years the British Museum has received fresh material of this genus from South America, represented by specimens collected on the Amazons by Messrs. Austen and Cambridge and by other examples from Ecuador. The Amazonian species is probably the same as *P. scabricauda*. The Ecuador species, two in number, are quite distinct. One of these is probably identical with the species collected on Machachi by Edward Whymper, which I erroneously, as it now proves, referred to *P. scabricauda*, Sauss. The male of one of this Ecuador species, from Riobamba, differs from the male of *P. scabricauda* in being furnished with very distinct claspers. These take the form of a stout lightly incurved process jutting backwards from the inferior angle of the coxa of each of the legs of the twentieth pair, and reaching to about the middle of the sternal plate of the twenty-first leg-bearing somite. A much smaller tubercular process occupies the same position upon the legs of the nineteenth pair. In the male of the other Ecuadorean species, from Cachavi, the claspers on the legs of the twentieth pair are much stouter and longer, extending backwards to the extremity of the sternal plate of the twenty-first leg-bearing somite (see fig. A). Those on the legs of the nineteenth pair are also relatively larger than in the Machachi and Riobamba specimens, and are short, cylindrical, apically rounded processes. The legs of the preceding pairs are also furnished with coxal tubercles. In the female of the Cachavi species there are coxal processes on the legs of the twentieth pair as large as those on the nineteenth pair in the male.

Secondary sexual characters of four distinct kinds are now known in the males of *Parotostigmus*. Firstly, there are the femoral processes of the anal legs, which I pointed out in 1890 and Brölemann in 1902 to be a male feature. Secondly, there are the coxal claspers above described. Thirdly, there is the remarkable modification of the last tergal plate, which is produced into a long and stout subcylindrical process in one of the Brazilian species, *P. caudatus*‡. Lastly, there is the modification of the tibial segment of the anal leg in *P. tibialis*, Bröl.

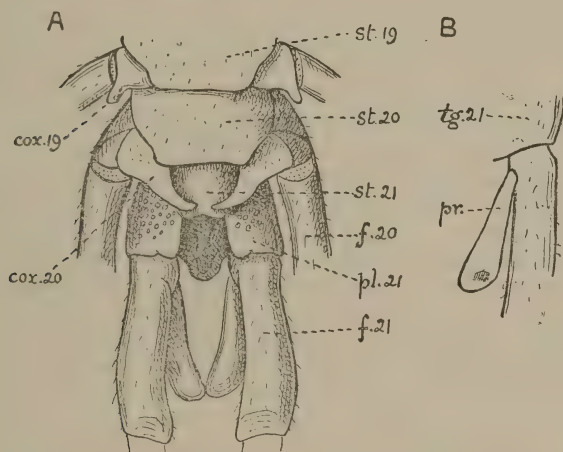
\* Ann. & Mag. Nat. Hist. (6) vi. p. 142 (1890).

† Mém. Soc. Zool. Fr. xiii. p. 96 (1900).

‡ Brölemann, 'Revista Mus. Paulista,' v. pp. 37 & 39 (1902).

It is significant that the claspers may be correlated with the femoral processes, but that, so far as is known, the modification of the anal tergite and of the tibia of the anal leg exists independently of the femoral processes and functionally replaces them.

That the femoral processes on the legs of the last pair are a sexual character appertaining to the male cannot, I think, be doubted; and I suspect they will be found to be characteristic of the majority of the species of *Parotostigmus*. If this suspicion be well founded it will prove that most of the described species have been based upon female examples. In this connexion it is significant that Brölemann records both



External sexual organs of the male of a species of *Parotostigmus* from Cachavi.

- A. Ventral view of posterior end of body. 19, 20, 21, nineteenth, twentieth, and twenty-first leg-bearing somites; *st.*, sterna; *f.*, femora; *pl.*, pleura; *cox.*, coxal processes.  
 B. Portion of tergum (*tg.* 21) of last leg-bearing somite and of the femur, with its process (*pr.*) furnished with posterior tuft of hair.

*P. denticulatus*, Poc., and *P. scabricauda*, Sauss., from Guatemala. On geographical grounds it is, *à priori*, improbable that the Brazilian *P. scabricauda* exists also in Guatemala. Hence I suggest that the examples referred by Brölemann to *P. scabricauda* are the males of the species he identified as *P. denticulatus*. If this be so, no fewer than five species of the genus will be known in which this peculiarity occurs in the male, namely, one from Guatemala, two

from Ecuador, one from Venezuela and Brazil, and one from Brazil. This fact forcibly suggests that other species of the genus, such as *P. spiculifer*, Poc., from St. Vincent, *P. muticus*, Karsch, from Peru, &c., will be found to be similarly equipped when further collecting has made them better known.

A small structural feature not previously noted, I believe, in connexion with these processes is the presence of a small tuft or transverse row of compactly set, short, red bristles, lying backwards lengthwise, near the posterior extremity of the dorsal side (see fig. B).

The only other genus of Scolopendridæ in which similar femoral processes have been described is the remarkable African form *Alipes* (*Eucorybas*). They have been detected in two species, namely, *A. appendiculatus*, Poc., from Nyasaland\*, and *A. calcipes*, Cook†, from Quango. In the description of *A. appendiculatus* I assigned this peculiarity to the male sex, and described as the female of this species an example from the same locality in which the process is represented by a spiniform tubercle. I see no reason to change this opinion. Moreover, since it appears to me to be improbable that a striking structural feature of this kind is present in some species and absent in others within the limits of the same genus, I am prepared to find that it is characteristic of all the species, and that the numerous specimens seen by myself, Cook, and others in which it is absent are either females or immature males‡. However that may be, the development of such an organ in *Parotostigmus* and *Alipes* must surely be evidence of affinity between them, especially when it is correlated in both with certain other structural features, such as the unarmed anal femora and pleuræ. The view that these genera are related is, moreover, quite in keeping with the faunistic similarities that obtain in other respects between tropical Africa and South America.

\* Ann. & Mag. Nat. Hist. (6) xviii. p. 95 (1896).

† 'Brandtia,' xvii. p. 70 (1897).

‡ In very young examples of *Alipes* the posterior legs are almost normal in shape, the distal segments being merely slightly compressed. The modification of these appendages characteristic of the adult is probably gradually acquired during growth, the final form perhaps being not attained until the final moult. Hence in comparing species with respect to this structure it is necessary that the specimens be certainly adult. According to Cook, these appendages differ considerably in a series of examples from the same locality. Possibly the variations pointed out are explicable in part to difference in age of the specimens examined.



## PROCEEDINGS OF LEARNED SOCIETIES.

## GEOLOGICAL SOCIETY.

February 25th, 1903.—Prof. Charles Lapworth, LL.D., F.R.S.,  
President, in the Chair.

The following communication was read:—

‘On the Occurrence of *Dictyozamites* in England, with Remarks on European and Eastern Floras.’ By Albert Charles Seward, Esq., M.A., F.R.S., F.L.S., F.G.S., Fellow of Emmanuel College, Cambridge.

The specimens described as a new species of *Dictyozamites* were obtained from a bed of ironstone, low down in the Estuarine Series, on the northern face of the Upleatham outlier, near Marske-by-the-Sea, by the Rev. John Hawell, F.G.S. The genus is also found in the Rajmahal Series of India, in Central Japan, and at Bornholm. Its probable taxonomic position is best expressed by placing it as a member of the Cycadophyta.

The Author proceeds to a comparison of the Bornholm, Indian, Japanese, and English floras; and as resemblances are masked by the use of different generic or specific names for plants which are either identical or represent closely-allied members of the same family, a special list of these floras has been prepared, in which, while the names at present in use are indicated, it is pointed out where obscured identities or resemblances exist. From this comparison the Author concludes that there was a greater similarity between the vegetation of Eastern and Western regions, during part at least of the Mesozoic Era, than is usually admitted; while the differences between Mesozoic floras of approximately the same geological age are for the most part slight and unimportant, when their wide geographical separation is considered. Equisetaceous plants are practically ubiquitous: several ferns of apparently the same species occur in the Far East and in Western Europe; cycadaceous plants are represented by cosmopolitan types, and the same may be said of the genus *Araucarites* and other members of the Coniferae. The most noteworthy exceptions are afforded by the Mesozoic representatives of the two isolated recent ferns *Matonia* and *Dipteris*; these two families—each with a surviving genus—played a conspicuous part in the vegetation of the Rhætic and succeeding Jurassic Epochs in Europe, and to a less extent in North America, but there are no satisfactory records of their existence in India or Japan. A similar state of things is illustrated by the Ginkgoales, the class of which the ‘maidenhair-tree’ of China and Japan forms the solitary survivor; the abundance of both *Ginkgo* and *Baiera* in the Mesozoic of Europe is in striking contrast to their almost complete absence in India.

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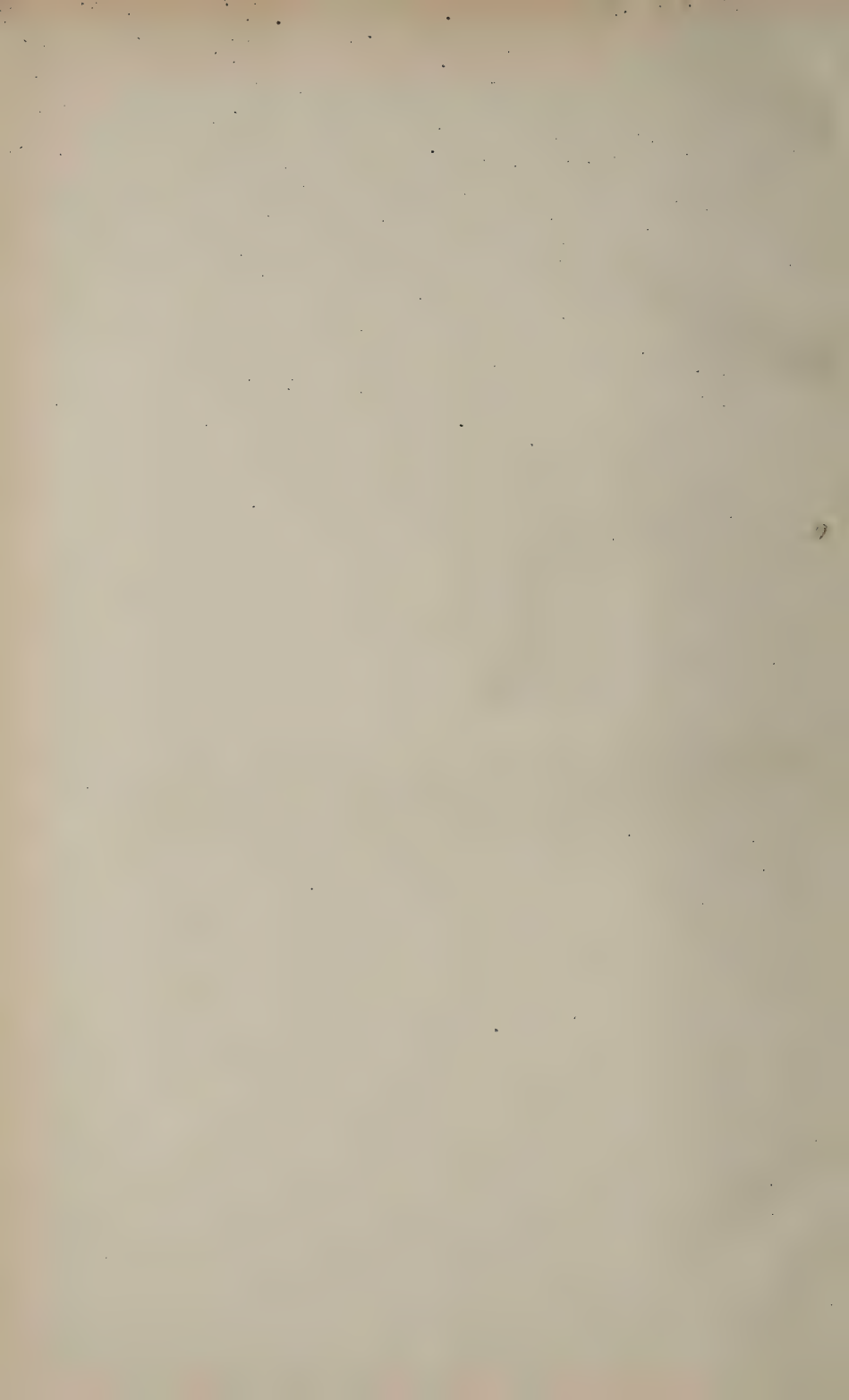
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